

OFFICE OF THE REGISTRAR:: DIBRUGARH UNIVERSITY

DIBRUGARH::ASSAM

PIN: 786 004



BID DOCUMENT

FOR

NAME OF THE WORK: SUPPLY, INSTALLATION & COMMISSIONING OF LABORATORY EQUIPMENTS AND COMPUTERS FOR DIFFERENT DEPARTMENTS FOR THE DIBRUGARH UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY (DUIET)

TENDER No: DU/RG/B.01.07/16/1589

Date: 13.07.2016



OFFICE OF THE REGISTRAR::DIBRUGARHUNIVERSITY :: DIBRUGARH

No. DU/RG/B.01.07/16/1589

Date: 13.07.2016

Tender Notice

Sealed Tenders are invited from reputed manufactures/authorized dealers having experience of working in IIT/NIT/State Engineering Colleges for supply, installation and commissioning of Laboratory Equipments and Desktop Computers for Dibrugarh University Institute of Engineering and Technology (DUIET) to be procured under AICTE-NEQIP Project, 2016-17.

Availability of Bid papers	From 13.07.2016 to 08.08.2016 (11:00 A.M. to 3.00 P.M.)
Last date for receipt of Bid	Up to 2:30 P.M. on 09.08.2016
Time & Date of opening of Bid	3:30 P.M. on 09.08.2016
Place of opening of Bid	Office of the Registrar, D.U.
Cost of Document	3,000/- (<i>Non refundable</i>)
EMD	2.5 % of the total Tendered Value

The tender documents can be obtained on any working day during office hours between 11.00 AM to 3.00 PM from the office of the undersigned, by paying the cost of tender document through Bank draft in favour of **The Registrar, Dibrugarh University**, payable at **SBI, Dibrugarh University Branch**, Dibrugarh. For details, please visit our website – www.dibru.ac.in

Sd/-
Registrar
Dibrugarh University

Copy to:

1. The Hon'ble Vice-Chancellor, Dibrugarh University for favour of kind information.
2. The Advisor (U.B.), AICTE, New Delhi for information.
3. The Director, D.U.I.E.T., for information.
4. Dibrugarh University Website.
5. Notice Board
6. Office File

Sd/-
Registrar
Dibrugarh University

NOTICE INVITING TENDER (NIT) FOR SUPPLY, INSTALLATION & COMMISSIONING OF LABORATORY EQUIPMENTS, COMPUTERS AND LEARNING MATERIALS FOR DIFFERENT DEPARTMENTS FOR THE DIBRUGARH UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY (DUIET) 2016-17

Dibrugarh University invites quotation for supply of equipment as per details at **ANNEXURE-III, in Two Bids** to reach the undersigned on or before 09.08.2016 upto 02:30 P.M.

BID INSTRUCTIONS:

1. Quotations will have to be submitted in TWO Bids. The address of the firm submitting the quotation and the Officer to whom the quotation is addressed must appear distinctly on sealed covers. Further, on sealed cover, the following are to be written:

*Quotation for Supply & Installation of Group..... Equipments ofLaboratory at
DUIET NIT Ref. No. DU/RG/B.01.07/16/1589 Dated 13/07/2016*

LAST DATE OF SUBMISSION: 09.08.2016 upto 02:30 P.M. Technical bids will be opened on the same day at 03:30 P.M. After evaluation of technical bids, financial bids of the successful bidders will be opened on a later date which will be notified in the Institute website.

2. A Vendor submitting bids for more than one group must submit the bids for each group in separate sealed covers.
3. **Submission of Compliance Certificate:** Duly filled and signed Compliance Certificates (*as per formats at Annexure I A & B*) are must with the Technical bid.
4. **Bid not transferable:** The bid documents are not transferable and the seal and signature of the authorized official of the firm's must appear on all the papers and envelopes submitted.
05. The quantity mentioned for each item in the *Annexure-III* may vary depending on requirements.

Group:	Item Sl. No.	Item name	
Sl. No.	Particulars		Rate
1	Basic Price	(per unit)	
2	Discount if any		
3	Total		
4	Taxes (pl. give break up)		
5	Total (per unit)		
6	Grand total for the item		
7	Transportation charge up to Dibrugarh University (if applicable)		
8	Transit Insurance covering all risk up to 10 days after delivery (if applicable)		
9	Grand total on door delivery at Dibrugarh University		
10	Annual Maintenance Contract rate (after expiry of warranty period)		

6. **Softcopy of the Technical bid as MS Word document must also be submitted in a CD in addition to the hard copies.**

TERMS & CONDITIONS:

1. **Rates:** Rates quoted in the **Price Bid** should be **on DOOR DELIVERY D.U. basis**, as per details below:

Note: Vague terms like 'packing, forwarding, transportation *etc.* extra' without mentioning the specific amount will not be accepted. Such offers shall be treated as incomplete and rejected. Bidders shall indicate their rates in clear/visible figures as well as in words and shall not alter/overwrite/make cutting in the quotation. In case of a mismatch, the rates written in words will prevail.

2. **Validity of Quotation:** Quoted rates must be valid for **180 days** from the date of quotation.
3. **Warranty:** The quoted equipment and components must be warranted for a minimum of one year or period specified against the item.
4. **Literature must:** All the quotations must be supported by the printed technical data sheet/ literature and the specifications mentioned in the quotation must be reflected/ supported by such printed technical data sheet/ literature. The model no. and specifications quoted should **invariably be highlighted** in the data sheets/ literature for easy reference.
5. **Details of supply** of similar items to Institutes of National Importance in the NE region must be provided.
5. **After Sales Service:** Vendor should clearly state the available nearest after sales service facilities in the region, without which the offer will be rejected.
6. **Dealership Certificate:** Dealers or Agents quoting on behalf of Manufacturer must enclose valid dealership certificate.
7. **Quality Certificates:** Valid certificate to prove the genuineness of the products and of International standard, as mentioned below, must be enclosed.
 - (a) Manufacturer's certificate.
 - (b) ISO/ISI certificate.
8. **End user list:** Vendor should provide end user list of their products at least for last 3 years with documentary evidences.

9. Earnest Money:

Refundable earnest money deposit (EMD) of 2.5% of the quoted value through demand draft drawn in favour of Registrar, Dibrugarh University, Dibrugarh, will have to accompany the technical Bid. The EMD of unsuccessful bidders shall be returned after award of contract. EMD of the successful bidder will be released on submission of the Performance Bank Guarantee or delivery of the ordered items, as applicable. Offers received without Earnest Money or valid Certificate shall be summarily rejected.

10. Performance Bank Guarantee (PBG): In case of items with order value of Rupees five lakhs (INR5,00,000/-) and above, the successful bidder shall furnish an unconditional PBG (as per format at *Annexure II*) for 10% of the Purchase Order value from a scheduled Bank of India, before release of the payment. Else 10% of the billed amount will be deducted as security deposit. Where the PBG is obtained by a foreign bank, it shall be got confirmed by a Schedule Indian bank and shall be governed by Indian Laws and be subject to the jurisdiction of courts at Dibrugarh. The PBG shall guarantee that,

- a) The Vendor guarantees satisfactory operation of the Equipment & components against poor workmanship, bad quality of materials used, faulty designs and poor performance.
- b) The Vendor shall, at his own cost, rectify the defects/replace the items supplied, for defects identified during the period of guarantee.
- c) This guarantee shall be operative from the date of installation till 60 days after the warranty period.

11. Delivery:

- a. **Time Limit:** Maximum within 45(forty-five) days from the date of issue of formal purchase order.
- b. **Safe Delivery:** All aspects of safe delivery shall be the exclusive responsibility of the vendor. At the destination site, the package will be opened only in the presence of NIT user/representative and vendor's representative. The intact condition of the package and the seal/indicators for not being tampered with shall form the basis for certifying the receipt in good condition.
- c. **Insurance:** The supplier is to establish 'All Risk Transit Insurance' coverage till door delivery at Dibrugarh University.
- d. **Part Delivery:** Acceptance of part delivery shall be a prerogative of the institute.
- e. **Penalty for delay in delivery:** The date of delivery should be strictly adhered to otherwise the Dibrugarh University authority reserves the right not to accept delivery in part or full.

12. Genuine Pricing: Vendor is to ensure that quoted price for the particular item is not more than the price quoted to any other customer in India, particularly to IITs/NITs and other Government Organization. Copy of the latest price list for the quoted item, applicable in India, must be enclosed with the offer.

13. **Conditional tenders not acceptable:** All the terms and conditions mentioned herein must be strictly adhered to by all the vendors. Conditional tenders shall not be accepted on any ground and shall be rejected straightway. Conditions mentioned in the tender bids submitted by vendors will not be binding on Dibrugarh University.
14. **VAT deduction at source:** In case of suppliers within Assam, VAT deduction at source, as per Order/ notification of the Government of Assam will be applicable.
15. **Late and delayed tender:** Late and delayed tender will not be considered. In case any unscheduled holiday occurs on the prescribed closing/opening date the next working day shall be the prescribed date of closing/opening.
16. **Payment:**
- (a) 100% payment within 30(thirty) days from date of delivery, installation and acceptance. Or
 - (b) 70% payment on delivery and balance on installation, acceptance and submission of PBG, wherever applicable.
 - (c) in case of acceptance of part delivery up to 50% of the value of the parts/ items delivered may only be paid.
17. **Enquiry during the course of evaluation not allowed:** No enquiry from the bidder(s) shall be entertained during the course of evaluation of the tender till final decision is conveyed to the successful bidder(s). However, the Purchase Committee or its authorized representative may make enquiries/seek clarification from the bidders. In such a case, the bidder must extend full co-operation. The bidders may also be asked to arrange demonstration of the offered items, in a short period of notice.
18. The acceptance of the quotation will rest solely with the Dibrugarh University authority, who in the interest of the Institute is not bound to accept the lowest quotation and reserves the right to himself to reject or partially accept any or all the quotations received without assigning any reasons.
19. **Force Majeure:**
- If the performance of the obligation of either party is rendered commercially impossible by any of the events hereafter mentioned that party shall be under no obligation to perform the agreement under order after giving notice of 15 days from the date of such an event in writing to the other party, and the events

referred to are as follows:

- i. Any law, statute or ordinance, order action or regulations of the Government of India,
- ii. Any kind of natural disaster, and
- iii. Strikes, acts of the Public enemy, war, insurrections, riots, lockouts, sabotage.

21. Termination for default: Default is said to have occurred

- (a) If the equipment or any of its component is found having poor workmanship, faulty designs, poor performance and bad quality of materials used.
- (b) If the supplier fails to deliver any or all of the services within the time period(s) specified in the purchase order or any extension thereof granted by the D.U. authority.
- (c) If the supplier fails to perform any other obligation(s) under the contract.
- (d) Under the above circumstances D.U. authority may terminate the contract / purchase order in whole or in part and forfeit the EMD/PBG as applicable. In addition to above, the authority may at its discretion also take the following actions: D.U. authority may procure, upon such terms and in such manner, as it deems appropriate, goods similar to the undelivered items/products and the defaulting supplier shall be liable to compensate D.U. authority for any extra expenditure involved towards goods and services obtained.

22. Applicable Law:

- (a) The contract shall be governed by the laws and procedures established by Government of India and subject to exclusive jurisdiction of Competent Court and Forum in Assam / India only.
- (b) Any dispute arising out of this purchase shall be referred to the Registrar, Dibrugarh University, Dibrugarh and if either of the parties hereto is dissatisfied with the decision, the dispute shall be referred to the decision of an Arbitrator, who should be acceptable to both the parties, to be appointed by the D.U. authority. The decision of such Arbitrator shall be final and binding on both the parties

23. Dibrugarh University reserves the right to Add / modify / relax or waive any of the conditions stipulated in the tender document whenever deemed necessary.

Sd/-
Registrar
Dibrugarh University

Encl.: ANNEXURE-I, ANNEXURE-II, ANNEXURE-III

Annexure -I

**A. COMPLIANCE CERTIFICATE FOR NIQ TERMS
(To be enclosed in the Technical bid)**

Sl. No.	NIT Terms and Conditions	Yes/No
01	Rate quoted as per instruction	
02	AMC rate after warranty provided	
03	Validity of quoted rate for 120 days agreed	
04	EMD submitted (appropriate certificate enclosed)	
05	PBG term agreed	
06	Payment term agreed	
07	Delivery terms agreed	
08	Warranty period agreed	
09	Literature: Printed Literature provided	
10	Dealership / distributorship certificate (in case of dealers/agents) provided	
11	Sale Service: address of after sale service in India (for imported goods)/ in the region provided	
12	Manufacturer certificate provided	
13	ISO/ ISI certification provided	
14	Applicable law terms agreed	

Signature with Seal:.....

Vendor: M/s.....

B. COMPLIANCE CERTIFICATE FOR SPECIFICATIONS

(One for each item must to be enclosed in the Technical bid)

Group:		Item Sl. No.	
Quoted Product:	Make:	Model No:	
Specifications as per NIT		Quoted Item Specifications*	Complied/ Deviation
Parameter	Specification		

Signature with Seal:

Vendor: M/S

* Vendor must quote the parameter specification of the quoted product in this column and not just copy the specification from the tender call document. Failure to do so will lead to rejection of the tender.

PERFORMANCE BANK GUARANTEE

To,
Registrar,
Dibrugarh University
Dibrugarh, Assam

WHEREAS _____ (Name of the Supplier) hereafter called the 'supplier' has undertaken, in pursuance of contract No _____ dated _____ 2016 to supply..... (description of the goods and Services) hereafter called 'the order'

AND WHEREAS it has been stipulated by you in the said order that the Supplier shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with the Supplier's performance obligations in accordance with the order.

AND WHEREAS we have agreed to give the Supplier a Guarantee:

THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of the Supplier, up to a total of _____ (Amount of the Guarantee in Words and Figures) and we undertake to pay you, upon your first written demand declaring the Supplier to be in default under the order and without cavil or argument, any sum or sums within the limit of..... (Amount of Guarantee) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until theday of.....2016.

Signature and Seal of Guarantors

.....
.....
.....

Date.....20.....

Address:.....

All correspondence with reference to this guarantee shall be made at the following address:

**Registrar,
Dibrugarh University
Dibrugarh, Assam**

ANNEXURE-III

TECHNICAL SPECIFICATION FOR EQUIPMENTS AND COMPUTERS TO BE PROCURED
UNDER AICTE-NEQIP 2016-17

A) New Laboratories Set Up under NEQIP:

i) Department of Computer Science and Engineering

Sl.No	Requirement Specification	Technical Specification	Quantity
1	Rational Software Architect		Licenses: 30 Nos.
2	Computer Organization and Architecture Laboratory		
3	PC for Software Engineering	DESKTOP PC Configuration : Intel Core i5 500 GB HDD 4GB RAM 18.5'' LED OS : Windows 8 (added)	15

ii) Department of Electronics and Communication Engineering

(Design and Simulation Lab)

Sl. No..	Equipment		Specification/Features	Quantity
1.	Software	LabVIEW Licensed version (multiuser)	National Instruments	01
	Hardware	Computer	DESKTOP PC Configuration : Intel Core i5 500 GB HDD 4GB RAM 18.5'' LED OS : Windows 8 (added)	15
		ONLINE UPS	Output Power 10 KVA Wave Form: Pure Sine Wave UPS Type: Online Double Conversion	01

iii) Department of Mechanical Engineering

SL No	Name of the equipment /software	Specifications	Quantity
1	Vapour compression refrigeration system with pc data acquisition	<p>Cooling capacity: 450 W, compressor hermetically sealed 0.25HP, Refrigerant 134a</p> <p>Condenser: Plate heat exchanger using water as heat transfer medium.</p> <p>Evaporator: Plate heat exchanger using water as heat transfer medium.</p> <p>Water reservoir, capacity: 400 l.</p> <p>3 Flow sensors:</p> <p>Water flow sensor (water condenser), range: 0.25-6.5 l./min.</p> <p>Water flow sensor (water evaporator), range: 0.25-6.5 l./min.</p> <p>Coolant flow sensor situated at the outlet of the condenser, Range: 5-60 l./h.</p> <p>9 Temperature sensors (5 sensors measure the coolant temperature and 4 sensors measure the water temperature):</p>	1
2	Vapour absorption refrigeration system with pc data acquisition	<p>Capacity 0.30 TR @Rated test conditions</p> <p>Compressor Hermetically sealed. Make :Emerson Climate Tech./ Tecumseh</p> <p>Products India Ltd./Danfoss Ltd./or any equivalent make.</p> <p>Condenser Forced convection air cooled.</p> <p>Condenser fan Axial flow.</p> <p>Drier/ filter Provided.</p> <p>Expansion device Capillary Tube.</p> <p>Evaporator Forced convection air cooled.</p> <p>Evaporator Fan Axial Flow Type Dehumidifier or Reheater 1000 Watts; Finned Type.</p> <p>Humidifier Provided Refrigerant R134a.</p> <p>HP / LP Cutout Alco/ or Danfoss / Castle or equivalent make.</p> <p>Temperature 6 Channel facility with digital display.</p> <p>Pressure 2 Nos.; Dial type pressure gauges.</p> <p>Refrigerant Flow Glass tube Rotameter provided.</p> <p>Air temperature DBT & WBT measurement by sling psychrometer.</p> <p>Air flow measurement By inclined tube manometer.</p>	1

iv) Department of Petroleum Engineering

SL. No.	Name of the equipment Specification	Quantity										
1	<p>Reid vapour pressure apparatus (To measure vapour pressure)</p> <p>Specification</p> <ol style="list-style-type: none"> 1. Power supply: AC 220 V±10%, 50 Hz 2. Total power consumption: ≤1700W 3. Relative humidity: ≤85% 4. Water bath temperature: 37.8°C 5. Temperature controlling accuracy: ±0.1°C 6. Heating power: 1600W 7. Ambient temperature:5~35°C 8. Pressure range: 0~200 kPa or 0~29 psi 	1 Nos.										
2	<p>Specific gravity apparatus (To measure Specific gravity of fluid)</p> <p>Specification</p> <table border="1"> <tr> <td>Measuring range</td> <td>0.001g - 120g</td> </tr> <tr> <td>Testing sorts</td> <td>S.G, API°, number of bbl per MT, w/gal conc.</td> </tr> <tr> <td>S.G precision</td> <td>0.0001</td> </tr> <tr> <td>API° precision</td> <td>0-100 API°</td> </tr> <tr> <td>w/gal concentration precision</td> <td>0.1%-100.0%</td> </tr> </table>	Measuring range	0.001g - 120g	Testing sorts	S.G, API°, number of bbl per MT, w/gal conc.	S.G precision	0.0001	API° precision	0-100 API°	w/gal concentration precision	0.1%-100.0%	1 Nos.
Measuring range	0.001g - 120g											
Testing sorts	S.G, API°, number of bbl per MT, w/gal conc.											
S.G precision	0.0001											
API° precision	0-100 API°											
w/gal concentration precision	0.1%-100.0%											
3	<p>Multifunctional oil test device (Pour, cloud, solidifying, plugging point)</p> <p>Specification</p> <ol style="list-style-type: none"> 1. Power supply: AC 220 V±10%, 50 Hz 2. Temperature control of chamber: <ol style="list-style-type: none"> (1) Chamber I: 0 °C, ±0.5 °C, temperatures in two cold baths are the same. (2) Chamber II: 0 °C, -17 °C, ±0.5 °C, temp in 2 cooling baths are the same. (3) Chamber III: -17 °C, -34 °C, ±0.5 °C, temp in 2 cooling baths are the same. (4) Chamber IV: Ambient to -70 °C, ±0.5 °C, temp in 2 cooling baths are same. 4. Ambient temperature: ≤30 °C 5. Relative humidity: ≤85% 6. Maximum power consumption: 1700 W 	1 Nos.										
4	<p>Dean & Stark apparatus (To measure the water content of crude oil)</p> <p>Specification</p> <ol style="list-style-type: none"> 1. Rated voltage: AC 220V±10% 50Hz 2. Power:0~650W (× 2) Continuously adjustable 3. Heating method: Heating jacket heating 4. Adjust the display: AC voltmeter 0~250V 5. Temperature control mode:Stepless voltage solid-state regulator 6. Distillation flask: 1000ml 7. Accepting bottles: 5ml, scale 0.05ml 8. Straight tube condenser: 400mm 9. Temperature accuracy: ± 0.1°C 10. Ambient temperature: 15~30°C Humidity≤85% 	1 Nos.										

5	Distillation apparatus for Petroleum (True Boiling Point/ASTM) Specification As per :ASTM D 86		1 Nos.
	Temperature range	Room temperature~+400°C	
	Resolution	0.1°C	
	Volume detection range	0~100mL	
	Resolution	0.1mL	
	Distillation rate	4~5MI/min	
	Cold bath temperature range	(-10~+70) °C	
	Ambient temperature	(5~40) °C	
	Relative humidity	≤85%	
	Power supply	220VAC±10%; 50Hz±10%	
Total power	1.5KW		
6	Pensky Martin Flash Point apparatus (To measure flash point and fire point of petroleum products) Specification		1 Nos.
	Test range:	Room temperature : 0 to 400°C	
	Repeatability:	±2°C	
	Power consumption:	<700w	
	Temperature:	Atmospheric temperature: 10°C-45°C,humidity: 30-80%	
	Power:	AC220V±10%	
Dimension	400×300×240mm		
7	Copper strip corrosion test apparatus (To measure the corrosive component of petroleum Products) Specifications Conforms to the specifications of: ASTM D189, D6074		1 Nos.
8	Smoke Point apparatus (To measure the smoke point of petroleum products) Specification		1 Nos.
	Testing range	: 0~50mm	
	Ambient requirement temperature	: 20~30°C	
	Humidity	: ≤80%	
9	Cleaveland open cup apparatus (for calculation of flash point and fire point) Specification		1 Nos.
	Thermometer	: IP 28°C.	
	Range	: 10 to +400°C	
	As per	: IS : 1448 P:69 ASTM D-92 and IP36/63	
10	Softening Point of Bitumen Specification		1 Nos.
	Voltage	: AC 220V,50HZ	
	Total power consumption	: 700 W	
	Temperature Resolution	: 0.01°C	
	Measuring Range	: +5 to +80°C or +32°C to +160°C	
	Stirring Speed	: 0 – 250 r/min	
	Heating Power	: 600 W	
Breaker Volume	: 800 ml		
Relative humidity	: ≤85%		

11	Ductility of bitumen (Ductilometer) Specification Temperature : 25 ± 0.5°C Speed : 5 cm/min ± 5.0 %.	1 Nos.
12	P ^H meter Specifications Measuring range (-1.99 -19.99)pH Temp. compensation range (0 to 100) °C	1 Nos.
13	Acid number Calculation apparatus Specifications 1, The power supply voltage : 220V ± 10% 50Hz 3, acid value measurement range : 0.001 and 0.999 mgKOH /g 4 Minimum Resolution : 0.001 mgKOH /g 5, measurement accuracy : Acid value	1 Nos.
14	Viscometer Specifications Range : 10- 100000 mPa.S Accuracy : 1% Power : 220 V, 50Hz	1 nos.
15	Electronic balance Specifications Inner box size : 370 x 255 x 165(mm) Gross weight : 3000g	2 Nos.
16	Oxidation stability (Gum content) Specification As per : ASTM 525	1 Nos.
17	Liquid petroleum products cloud & crystallization point Specification Power supply 220VAC±10%; 50Hz±10% Input power <2kw Refrigeration medium >95% purity of anhydrous ethanol Cold bath range (30~40)°C Temperature control accuracy 0.1°C Cooling time It need less than 60min. from room temp. 0 -40°C Ambient temperature (5~40)°C Relative humidity ≤85%	1 Nos.
18	Octane Number Specification As per ASTM D2699 Range: 30 to 120	1 Nos.
19	Cetane Number Specification As per : ASTM D613, Range : 0 to 100	1 Nos.
20	Calorific Value Specification 1. Measuring range : 5 °C~ 40 °C 2. Temperature resolution : 0.0001 °C 3. Heat capacity of precision : 0.1%	1 Nos.

21	Beaker (50ml, 100ml, 200ml, 500ml)	5 Nos. Each
22	Pipet (50 ml)	10 Nos.
23	Measuring Glass Cylinder (1000ml)	10 Nos.

B) Up gradation of existing Laboratories under NEQIP:

**i) Department of Electronics and Communication Engineering
Mobile Communication lab**

Sl. No.	Equipment	Specification/Features	Quantity
1	Analog Oscilloscope	60MHz bandwidth, X10 magnification, Sweep Delay, 5 ns max Sweep Speed, Alternate triggering, Variable Hold Off & Line Triggering, Component and Continuity Tester, Large Digital Readout with Backlit LCD	05
2	Signal generator	Wide Range of Frequencies from 0.0002Hz (i.e. 5000s) to 20MHz (i.e. 50ns) , Choice of Eight Selectable Waveforms, Trigger and Gate Modes with Adjustable Start/Stop Control.	05
3	Digital Storage Oscilloscope	Dual Trace Digital Storage Oscilloscope, Display 6 inch, Power Supply 100-225V Bandwidth: 25MHZ / 40MHZ / 100MHZ. Dual channels /dual traces, X-Y mode. 6" display,	05
4	TDM - PAM Transmitter Receiver	Crystal controlled clock, On-board synchronized analog Signal Generator (DC and Sine wave)	01
5	PAM-PPM-PWM Modulation-Demodulation Techniques	PAM-PPM-PWM Modulation & Demodulation techniques, using Natural & Flat-top sampling, Analog Sample, Sample & Hold and Flat-top outputs	01

Electrical Machine Laboratory:

Sl. No.	Equipment	Specification/Features	Quantity
1	Ammeter	MI, 0-10 A , AC	02
2	Ammeter	MI, 0-15 A, AC	02
3	Voltmeter	MI, 0-300 V, AC	03
4	Lamp bank load	Resistive, 1kW, 230 V	02
5	Resistive load bank	Single phase, 15 A	01
6	Tester set with pliers	-	02

Control Systems Laboratory:

Sl. No.	Equipment	Technical Specification	Quantity
	Trainer Kit for Study of the Performance of P, PI, PD, PID Controller of Various Processes	Simulated blocks – integrator, time delay, time constants, error detector and gain Gain configurable as P, PI, PD or PID Integral time: 10 - 100ms	03

		Derivative time: 2 - 20ms	
		Proportional gain 2-20	
		Signal sources – triangular and square wave with peak to peak value 1 volt with max 40 Hz frequency g. 3½ digit DVM for d.c. measurements	
		Patch cords and terminals for CRO connection	
	Trainer Kit for Study of AC SERVOMOTOR	2-phase a.c. servomotor - 12V/ 50Hz per phase	03
		Small generator for loading	
		4-digit speed display	
		3-digit time constant display	
		3½ digit r.m.s. voltmeter	
	Trainer Kit for Study of DC MOTOR	3½ digit d.c. panel meter	
		12V, 8W d.c. motor	03
		Small generator (2W) for speed pick up and loading	
		4-digit speed display	
		3-digit time constant display	
	Trainer Kit for SPEED CONTROL OF STEPPER MOTOR	3½ digit voltmeter and current meter for d.c. measurement	
		<input type="checkbox"/> Stepper Motor - (Angle control / Clockwise/ Counterclockwise) <input type="checkbox"/> DC Motor controlled with PWM Control - Direction and speed control <input type="checkbox"/> Motor control line and Power lines terminated at box connector <input type="checkbox"/> 20-pin FRC Cable - To connect host boards (Microcontroller/Processor)	03
	Trainer Kit for the Study of LAG LEAD COMPENSATOR	- Digital Frequency Counter, Square Wave Generator, Precise Signal Conditioning, Sensitive, linear, stable and accurate, 2 mm socket for interconnection, Test points at various blocks to measure and observe the signals, On Board Touch Switch.	03

Basic Electronics and Electrical Laboratory:

Sl. No	Equipment	Specification/Features	Quantity
1	AC & DC Wave shaping circuit trainer kit	AC & DC circuit analysis :- Ohms law, network theorem, RL, RC, RLC circuits. Wave shaping, Differentiator, integrator, filter etc.	05
2	Digital Multimeter	DC voltage-200 mv to 1000V, DC current-200micro amp to 20 amp. AC current- 200micro amp to 20 amp.	05

Microwave and Optics Laboratory:

Sl. No.	Equipment	Specification/Features	Quantity
1	Optical source	Optical Source Type : LED Peak Wavelength : 880nm Spectral Width : 100nm Optical Power Output range : 5dB range (Cont. variation) Max power output into 50/125 μ : -20dBm GI Fibre (NA 0.2) Output Stability : <0.3dB Optical Output Connector : ST type	02
2	Optical Power Meter	Sensor : Large area Si Photo detector Type remotely connected Calibrated : 660nm / 850nm Wavelength (switch selectable) Optical Input : 600 – 1000nm Wavelength Optical Input : +3dBm to -60dBm Power Display Type : 3½ Digit LCD Accuracy : + 0.2dB Resolution : 0.1dB Operation : 9V Battery or 9V wall mount adaptor Optical Interface : ST Type for GF & Bare Connectors Fibre Adapter for PF	02

ii) Department of Mechanical Engineering

SL No	Name of the Equipment	Specifications	Quantity
1	Universal governor apparatus for DOM lab		1
2	Cam analysis apparatus for DOM lab		1
3	Whirling of shaft for DOM lab		1
4	Spring balance for DOM lab	1kg to 10kg 1kg to 25kg 1kg to 50kg	21

5	Simple pendulum for DOM lab		5
6	Variable compression ratio diesel engine computerised test rig for i-c engine lab	Type 1 cylinder, 4 stroke Diesel, water cooled, power 3.5kW at 1500rpm, stroke 110mm, bore 87.5mm. 661cc, CR17.5, Modified to VCR engine CR 12 to 18, with electric start arrangement, battery and charger	1
7	Brinnel microscope for strength of material lab	For test well Brinnel hardness tester	1
8	Bevel Protractor for mechanical measurement lab		2
9	Sine bar for mechanical measurement lab		1
10	Slip gauge for mechanical measurement lab	Range- 1.001 to 1.009 mm	1
11	Micrometre Head for mechanical measurement lab	Measuring range:0-25mm Resolution:0.001mm Accuracy:±0.003mm	2
12	Optical microscope for mechanical measurement lab	Objective with Long Working Distance (up to 3.7mm for40X Objective)	1

iii) Department of Petroleum Engineering

Sl.No	Technical Specification	Quantity
1	Analytical balance. (Readability=0.1 mg) (Capacity=200 gm)	1
2	Turbidity Meter (Range 0 to 200.00 NTU) (Resolution 0.1NTU)	1
3	Electronic Balance (Readability=0.1 mg) (Capacity=3 kg)	2
4	Mud Mixture (Three Spindle)	1
5	Flask of the Soxhlet Apparatus Capacity: 200 ml Capacity of Flask: 500ml	4
	<p>Core Cutting Machine: Suitable to cut cores of concrete, Rocks, Stones, or the similar material.</p> <ul style="list-style-type: none"> • The machine is suitable for core samples of size up to 150mm diameter • Suitable for 230 volts AC, Single Phase • Diameter: 50 - 200 mm • Cooling Water Arrangement • Easy to operate • Corrosion resistance • Table Mounted. • Stable Construction. • Feed Arrangement For Cutting. 	
	<p>Core Plugging Machine:</p> <ul style="list-style-type: none"> • Coring bit internal diameter: 1", 1.5" • Maximum coring depth: 5 inches (12.5 cm) • Drip pan dimension:L x W x H: 600 x 300 x 250 mm • Compatible coolant: Oil/Water • Drill speed: 380, 500, 780, 1150, 1770, 2600, 4000, 5250 RPM • Motor power: 1100 watts, 1500 RPM • Electrical: 220 VAC 1 phase, 60 Hz 	
	<p>End Facing Machine:</p> <ul style="list-style-type: none"> • Suitable to grinding / Smoothing cores of concrete, Rocks, Stones, or the similar material • excellent cutting and grinding efficiency • easy to operate and requires minimum maintenance • Optimum performance • Low maintenance • Longer serving life • Power: 230 V • Size: 200 mm • Diameter: 55 mm dia. x 140 mm 	