



**Institute of Engineering and Technology , Uttar Pradesh,**  
**Lucknow**

**TENDER INFORMATION ON PROCUREMENT OF LAB EQUIPMENTS FOR THE**  
**VARIOUS ENGINEERING DEPTTS OF IET, LUCKNOW**

**Ref. No IET/Registrar Camp/2018-3002**

**Date : 20-06-2018**

Applications are invited from reputed and experienced Vendors/Firms to participate in tender formalities for purchase of lab equipments of following engineering departments:-

- (a) Mechanical Engineering Deptt
- (b) Civil Engineering Deptt
- (c) Electronics Engineering Deptt
- (d) Electrical Engineering Deptt

(List of lab equipments pertaining to above departments are enclosed as annexure-I)

Interested vendors/ suppliers/Firms may respond in the prescribed format given at the end of this document, along with one copy each of the requisite documents through any mode via. Speed Post/Registered Post/Courier/by hand. **The Envelope should be marked with “Application for participation in Tender Formailities for purchase of Lab Equipments (Vendor must quote the department name in the envelope for which he is interested for tender participation).”**

The duly filled application form along with necessary documents may be **submitted to the Registrar, IET, Lucknow, marked with following address, on or before 30<sup>th</sup> Jun 2018.**

**REGISTRAR,**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY,LUCKNOW**  
**SITAPUR ROAD, ENGINEERING COLLEGE CHAURHA, LUCKNOW**  
**226021- Uttar Pradesh**



**Institute of Engineering and Technology , Uttar Pradesh,**  
**Lucknow**

**ELIGIBILITY CRITERIA FOR PARTICIPATION:**

Applications from reputed and experienced Vendors/Firms are invited to seek participation in tender formalities for supply of lab equipments for engineering deptt. The eligibility criteria is appended below :-

- The vendor should have satisfactorily supplied lab equipments to any Government Universities-Central/State in last two Financial Years (satisfactory supply certificate along with order copies should be attached).
- The vendor should have a minimum annual Turnover of Rs. 20 Lakh in last Financial Year 2016-17 (C.A. certificate should be attached).
- The vendor should have a minimum average annual turnover of Rs.20 Lakh in the last three (3) consecutive financial years (C.A. Certificate should be attached).
- The vendor should have to enclose a single order worth minimum Rs.05.00 Lakh for supply of lab equipments to any Central/State Government University/Institute of National Importance along/Engineering Institute with Satisfactory Supply Certificate for particular order in last financial Year (Order copy and satisfactory supply certificate should be attached).
- The vendor should enclose ITRs for last 3 Assessment years along with photocopy of P/L and Balance Sheet duly certified by Chartered Accountant.
- The vendor should not be ever been debarred / blacklisted for doing business from any Government Organization. If No, Please furnish an affidavit raised on non – judicial stamp paper of Rs. 100 (Rupees One Hundred only).
- The Institution is not bound to accept the qualified bidders for participation and reserves the right to accept or reject any or all the proposals without assigning any reasons thereof. The acceptance of the qualified bidders rests with the Institutions on its selection criteria. Decision of the Director of the Institute on any dispute related to participation of vendor for supply of Lab Equipments shall be final and binding.



**Institute of Engineering and Technology , Uttar Pradesh,**  
**Lucknow**

**(APPLICATION FORM)**

To  
The Director  
I.E.T.  
Lucknow (Uttar Pradesh)

Sir,

In response to your advertisement placed in Danik Jagarn & Danik Aj Newspaper and Institution website for participation in tender formalities for supply of lab equipments to IET, Lucknow, please find my duly filled application form along with relevant documents.

1. Name of the Firm \_\_\_\_\_
2. Address \_\_\_\_\_
3. Contact No \_\_\_\_\_ Fax \_\_\_\_\_  
Mobile.....
4. Website (if any) \_\_\_\_\_
5. E-mail address \_\_\_\_\_ @ \_\_\_\_\_
6. Date of Establishment of Firm \_\_\_\_\_
7. Name of the Proprietor/Director \_\_\_\_\_
8. Name of Partner (if any) \_\_\_\_\_
9. Registration No. of FPBAI/DSBPA, etc. (If applicable) \_\_\_\_\_ -  
(Please enclose a copy of the Registration Certificate.)
10. Permanent Account No.: \_\_\_\_\_  
(Attach Copy of PAN )
11. GST No. (Attach copy of GST)
11. Do you have satisfactorily supplied lab equipments to Government Universities-Central/State & Institutions of National Importance/Engineering Institutes in last two financial years. The copies of the purchase orders and satisfactory performance certificates should be attached.
  - a)
  - b)

- c)  
d)
12. Applicant Supplier must have a minimum Turnover of Rs. 20 Lakhs in last Financial Year 2016-17 (please attach Certificate issued by Chartered Accountant).
13. The vendor should have a minimum average annual turnover of Rs.20 Lakh in the last three (3) consecutive financial years(attach proof):
- |             |   |
|-------------|---|
| (a) 2016-17 | : |
| (b) 2015-16 | : |
| (c) 2014-15 | : |
| Total       | : |
| Average     | : |
14. Whether you are income tax payee? If so, please attach a copy of Income tax return (ITRs) filed for last three (03) consecutive years along with photocopy of P/L and Balance Sheet duly certified by Chartered Accountant
15. The vendor should have to enclose a single order worth minimum Rs.05.00 Lakh for supply of lab equipments to any Central/State Government University or any engineering institute along with Satisfactory Supply Certificate for particular order in last Financial Year (2016-17) (Order copy and satisfactory supply certificate should be attached).
16. Have your firm ever been debarred / blacklisted for doing business from any government organization? If No, Please furnish an affidavit raised on non-judicial stamp paper of Rs. 100 (Rupees One Hundred only).

### **DECLARATION**

I/ We do hereby declare that entries made in this application form are true to the best of my/ our knowledge and belief.

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Signature of Partners/Proprietors with seal

Date:

Place:

# **Electronics Engineering Department**

## **Electronics Engineering Department**

**Proposal of Transducers & Sensors Lab: Total Estimated Cost Rs 2,51,000**

### **Group A- (Proposal of Transducers & Sensors Lab)**

Item Name	Detail Description	Qty
Op-Amp Characteristics Trainer	±15V, ±12V and +5 V fixed DC power supply; DC 1.5 to 10V, -1.5 to -10V variable power supply, IC 741 Op-Amp stage, 555IC Stage, LM 331IC Stage, 16 pin ZIF socket, Resistor, and Capacitor bank, Potentiometer, Zener Diode, NPN Transistor, MOSFET, LED and Breadboard Experimental manual, Interconnection cord,	05
Digital Multimeter	Digital Multimeter – 3 3/4 Digit Counts- 4000 Display- Large LCD Facility- Data Hold( Max & Min Value Hold) DCV-1000V, ACV-750V With Diode Test, Transistor Testing, Continuity Buzzer, Input Impedance 10 M Ohm	05
Network and Bridge Trainer	<b>FEATURES:</b> Demonstrates the basic theorems, Demonstrates the two port network parameters, Demonstrates the different AC bridges, Analysis of network, On-board power supply, Resistor, capacitor, Inductor bank , Multimedia based interactive e-manual <b>SPECIFICATIONS:</b> On-board dual isolated power supply 0 to 20 V, Variable current source, Resistor bank, Capacitor ( fixed and variable) bank, Inductor bank, bank, Bread board, Interconnection points and test points, Experimental manual, Interconnection cord,	05

Total

# Electronics Engineering Department

## Electronics Engineering Department

**Proposal of Industrial Instrumentation Lab: Total Estimated Cost Rs 3.4**

### Group A- (Proposal of Industrial Instrumentation Lab)

S.N o.	Item Name	Detail Description	Qty
1.	Blood Pressure Measurement Trainer	<b>Blood Pressure Measurement Trainer</b> <b>Display</b> : Large screen crystal digital display <b>Inflation</b> : Automatic with built in pump <b>Technology</b> : Oscillometric method monitor attached arm cuff <b>Deflation</b> : Automatic rapid air release method <b>Sensor</b> : Pressure detection mechanical capacitance Pressure sensor <b>Frequency response</b> : 25-125 Hz <b>Measurement range</b> : 30-280 mm Hg <b>Accuracy Blood pressure</b> : $\pm 4$ mm Hg <b>SMPS Based Power Supply</b> : $\pm 10\%$ , 50Hz	01
2.	ECG Simulator	<b>ECG Simulator</b> <b>Generating Range</b> : 30-150 heartbeats/minute <b>ECG Amplitude Range</b> : 150-400mv <b>Systole Indication</b> : Audible and Visible controls Separate output channels (Left Arm, Right Arm, Left Leg, Right Leg, Chest) for representing Standard Limb leads configuration <b>In Bipolar Leads</b> : Lead I, Lead II, Lead III <b>In Uni polar Leads</b> : AVR, AVL, AVF, Chest Limb leads. <b>SMPS Based Power supply</b> : 220V $\pm 10\%$ , 50/60 Hz <b>Accessories included</b> : Banana connectors, extensive e-Manual, Mains Cord, adequate no. of patch cards.	01
3.	Electro-Encephalograph Trainer	<b>Electro-Encephalograph Trainer</b> <b>No. of channels</b> : 1 <b>Gain Control</b> : Variable <b>Frequency Response</b> : 0.1 – 3 KHz <b>CMMR</b> : Better than 80 dB <b>Output</b> : Compatible with oscilloscope Compatible with EEG simulator <b>EEG Simulator Output</b> : Standard EEG Signal Output Alpha, Beta, Delta and Theta wave generator Differential output for EEG Amplifier Adjustable output level. <b>Biomedical Electrodes</b> : Silver surface electrodes <b>SMPS Based Power Supply</b> : 220 V $\pm 10\%$ , 50 Hz <b>Accessories included</b> : Silver surface electrodes, Gel, Manual, connectors, Mains cord	01
4.	Electro-Myograph Trainer	<b>Electro-Myograph Trainer</b> <b>No. of channels</b> : 2 <b>Gain control</b> : Variable <b>Frequency Response</b> : 1 Hz to 10 KHz <b>CMRR</b> : Better than 80 dB <b>Filter</b> : 1 Hz – 2 KHz, 1 Hz – 4 KHz, 1 Hz – 10 KHz <b>Simulator Output</b> : Standard EMG signal output Differential output for EMG Amplifier Adjustable output level <b>Biomedical Electrodes</b> : Silver Surface Electrodes <b>Power Supply SMPS Based</b> : 220 V $\pm 10\%$ , 50 Hz <b>Accessories included</b> : Silver surface electrodes, Gel, Manual, Connectors, Mains cord.	01

## Electronics Engineering Department

5.	Heart Rate Monitor-cum-ECG Trainer	<b>Heart Rate Monitor cum ECG Trainer</b> <b>Measuring Range</b> : 30-180 heartbeats/minute <b>Accuracy</b> : $\pm 2$ heartbeats/minute <b>Gain Adjustment</b> : 800-2000 variable <b>Heart Rate Display</b> : $3\frac{1}{2}$ Digit seven segment <b>Tachycardia limit Range</b> : 0-180 heartbeats/min Adjustable through potentiometer <b>Bradycardia limit Range</b> : 0-100 heartbeats/min Adjustable through potentiometer <b>Display</b> : $3\frac{1}{2}$ Digit LCD <b>PC Interface</b> : Through Sound Card (Facility provided for real time analysis of heart rate) <b>ECG acquisition module</b> : Real time ECG acquisition with 200 samples per second. 8-bit A/D converter with Sound card Input <b>SMPS Based Power Supply</b> : 220 V $\pm$ 10%, 50Hz/60Hz. <b>Accessories</b> : Mains Card, Extensive e-Manual, Software for PC Interface, ECG electrodes, ECG Gel, Banana to 5 pin Din connections.	01
6.	Phonocardiograph Trainer	<b>Phonocardiograph Trainer</b> <b>Frequency response</b> : 1Hz – 10 KHz <b>CMRR</b> : Better than 80 db <b>Filters</b> : 25Hz - 100 Hz, 50Hz - 100 Hz, 100Hz - 750 Hz, 250Hz - 1.2 KHz <b>Gain adjustment</b> : 800-2000 variable Audio amplifier for Phonocardiogram, output with Headphone out. <b>PC Interface</b> : Through Sound card Input to PC with the help of software. The software consists of display & control window for real time analysis of PCG. The PCG waveform should display in time domain as well as frequency domain. <b>SMPS Based Power supply</b> : 230V, $\pm$ 10%, 50Hz <b>Accessories Included</b> : Real time PCG acquisition Software, cable for PC Interface (Sound Card), Phonocardiogram sensor, Interactive e-Manual, Main cords.	01
7.	Pulse Measurement Trainer	<b>Pulse Measurement Trainer</b> <b>Cable</b> : 2 core shielded cable <b>Cable length</b> : 1.1 meter approx. <b>Connector plug</b> : 3.5 mm stereo plug For IR Phototransistor (3mm) <b>Chip material</b> : Silicon <b>Lens color</b> : Black <b>Rise and fall time</b> : 15/15 $\mu$ s For IR LED (3mm) <b>Material</b> : GaAlAs <b>Lens color</b> : Blue <b>Wave length</b> : 940 nm <b>Operating angle</b> : $\pm 30^\circ$ <b>Display</b> : Provide LCD Display for Pulse count <b>Accessories</b> : Mains Card, extensive e-Manual.	01
8.	Respiration Rate Monitor	<b>Respiration Rate Monitor</b> <b>Measuring Range</b> : 0-60 breaths/minute <b>Accuracy</b> : $\pm 1$ breaths/minute <b>Respiration-Rate Display</b> : $3\frac{1}{2}$ Digit LCD display <b>Tachypnea limit range</b> : 0-50 breath/minute <b>Apnea period selection</b> : 10,20,30,60 or 90- sec. <b>Transducer</b> : Based on Piezoelectric <b>SMPS Based Power Supply</b> : 220V $\pm$ 10%, 50/60 Hz <b>Accessories</b> : Respiration sensor, Interactive e-Manual, Mains cord.	01

## Electronics Engineering Department

### Group B- (Proposal of Industrial Instrumentation Lab)

S.No.	Item Name	Detail Description	Qty
1.	CRO	30 MHz Oscilloscope with Color LCD Digital Readout & Component Tester Specification – Builtin Component Tester X-10 Magnification 20ns Maximum sweep speed Electronic Control Display Accuracy +_3%	05
2.	Function Generator	Function Generator 10 MHZ AM/FM Function Pulse Generator with 40 MHz Frequency Counter Micro Controller Based <b>Operating Mode</b> – Sine Square, Triangle, Ramp Pulse & TTL Ext Modu-FM/AM std, AM ,balance, FM, PWM <b>Frequency Counter</b> - DC-40MHz, Sensitivity -0.5Volt	05



# Mechanical Engineering Department

## Heat Transfer Lab

Sl.no.	Item	Specification	Qty
1	HEAT TRANSFER IN NATURAL CONVECTION APPARATUS	<input type="checkbox"/> Enclosure size - 200x200x500 mm <input type="checkbox"/> Tube size= (Test cylinder ) 32 mm (O.D.) x 400 cm. Long <input type="checkbox"/> Nichrome heater (Cartridge type) <input type="checkbox"/> Control Panel Comprising of : <input type="checkbox"/> Voltmeter - 100/200 V.AC. <input type="checkbox"/> Ammeter - 0 - 2 A.AC. <input type="checkbox"/> Dimmer stat - 0 - 2A. 240V <input type="checkbox"/> Digital Temperature Indicator 0-300°C 1°C least count ChromelAlumel Thermocouples providing with cold junction compensation	1
2	HEAT TRANSFER IN FORCED CONVECTION APPARATUS	<input type="checkbox"/> Enclosure size - 75mm dia,500 mm length <input type="checkbox"/> Tube size= (Test cylinder ) 32 mm (O.D.) x 400 cm. Long <input type="checkbox"/> Nichrome heater (Cartridge type) <input type="checkbox"/> Control Panel Comprising of : <input type="checkbox"/> Voltmeter - 100/200 V.AC. <input type="checkbox"/> Ammeter - 0 - 2 A.AC. <input type="checkbox"/> Dimmer stat - 0 - 2A. 240V <input type="checkbox"/> Centrifugal Blower with fan regulator <input type="checkbox"/> Orifice meter and Manometer arrangement to measure flow rate <input type="checkbox"/> Digital Temperature Indicator 0-300°C 1°C least count Chromel Alumel Thermocouples providing with cold junction compensation.	1
3	EMISSIVITY MEASUREMENT APPARATUS	<input type="checkbox"/> Test plate & Reference plate size - 160mmdia.(aluminum) <input type="checkbox"/> Enclosure size-58 cm x 35 cm with one side of Perspex sheet. <input type="checkbox"/> Heater-200v,350 watt, Nichrome wire type Sandwiched between mica sheets. <input type="checkbox"/> Control panel comprising of: <input type="checkbox"/> Voltmeter - 0-100/200v(2 no) <input type="checkbox"/> Ammeter - 0-2A(2 no) <input type="checkbox"/> Dimmer stat - 0 - 2A. 240V <input type="checkbox"/> Digital Temperature indicator 0-300°C with 1°C least count Using chromel alumel thermocouples. Provided with cold junction compensation	1
4	THERMAL CONDUCTIVITY OF COMPOSITE WALL APPARATUS	<input type="checkbox"/> M.S plate :25 cm x 12mm thick <input type="checkbox"/> Bakelite plate : 25 cm x10mm thick <input type="checkbox"/> Aluminum plate:25 cm x10mm thick <input type="checkbox"/> Heater - Nichrome wire strip type heater of 350watt capacity <input type="checkbox"/> Control panel comprising of : <input type="checkbox"/> Voltmeter - 0 - 100/200 volts <input type="checkbox"/> Ammeter - 0 - 2 amp. <input type="checkbox"/> Dimmer stat for heater 0-230 volts 2 amp. <input type="checkbox"/> Temperature indicator - 0 - 300°C with 1°C least count. Using chromelalumel thermocouples, provided with coldjunction compensation.	1
5	HEAT TRANSFER FROM PIN FIN APPARATUS	<input type="checkbox"/> Fin - 15 mm diameter (approx.) 15 cm. Long (approx). <input type="checkbox"/> Duct size - 15 cm x 10 cm x 100cms long (approx) <input type="checkbox"/> Blower of suitable capacity with 1 H.P. single phase motor. <input type="checkbox"/> Control panel comprising of :	1

PARALLEL FLOW  
AND COUNTER FLOW  
HEAT EXCHANGER  
APPARATUS

- System : Water to Water, Concentric tube Type
- Heat Exchanger : Length 1 m (approx)
- Outer Tube: Material Stainless Steel. ID 27.5mm, OD 33.8mm (approx)
- Inner Tube: Material Stainless Steel, OD 12.7mm (approx)
- Water Flow Measurement : Rotameters (2 Nos) one each for cold & hot fluid.
- Hot Water Tank : Made of Stainless Steel. Insulated with ceramic fiber wool.
- Hot Water Circulation : 0.5 HP mono block Pump
- Heaters : 2 kW Nichrome wire heater (1 no)
- Control Panel Comprising of
  - ☐ Digital Temperature Controller : 0-199.9 C (For Hot Water Tank)
  - ☐ Digital Temperature Indicator : 0-199.9 C With Multi-Channel scanner
  - ☐ Temperature Sensors : RTD PT-100 type

**Department: Electrical Engineering Department**  
**Institute of Engineering and Technology, Lucknow**  
(Lab Equipment only)

**Control Laboratory**

Control Laboratory			
PACKAGE			
Sl.N o.	Item Name	Specification	Item Qty.
1	<b>LINEAR SYSTEM SIMULATOR LAB KIT (Including installation and demonstration)</b>  <b>List of Experiments</b> <ul style="list-style-type: none"> <li>Open and closed loop step response of First Order type-system for various value of gain.</li> <li>Open and closed loop step response of Second Order type-0 and type-1 systems.</li> <li>Response of third order system.</li> <li>Steady-State errors for closed loop configuration through triangular wave input.</li> </ul>	<ul style="list-style-type: none"> <li>Simulated first, second and third order system of type-0 and type-1.</li> <li>Calibrated variable gain amplifier (Resolution 1:1000).</li> <li>Built-in signal sources <ul style="list-style-type: none"> <li>Square wave and Triangular</li> <li>Frequency: 45-90Hz.</li> <li>Amplitude: 0-2.5V approx.</li> </ul> </li> <li>Trigger output for perfectly steady display on CRO.</li> <li>Uncommitted amplifier for phase adjustment.</li> <li>Provision for disturbance inputs.</li> <li>Complete in all respect, except a measuring CRO.</li> <li>Lab kit shall be suitable for satisfactory operating at 1-phase, 240V AC supply.</li> <li>User manual shall be provided</li> </ul>	2
2	<b>TEMPERATURE CONTROLLER LAB KIT (Including installation and demonstration)</b>  <b>List of Experiments</b> <ul style="list-style-type: none"> <li>Identification of the oven parameters.</li> <li>Study of ON-OFF temperature control (with adjustable relay characteristics).</li> <li>Study of P, PI, PD and PID control having adjustable</li> </ul>	<ul style="list-style-type: none"> <li>Temperature controller with facilities for P, I, D and relay control blocks.</li> <li>Operating temperature: Ambient to 90°C.</li> <li>Separate controls for P, I, D channel gains.</li> <li>Two settings for relay hysteresis.</li> <li>Fast 25W oven fitted with IC temperature sensor.</li> <li>Digital display of set and measured temperature</li> </ul>	2

	coefficients.	<ul style="list-style-type: none"> <li>on 3 ½ digit built-in DVM.</li> <li>• Buttered output for recorder.</li> <li>• IC regulation in controlled circuit power supplies.</li> <li>• Lab kit shall be suitable for satisfactory operating at 1-phase, 240V AC supply.</li> <li>• User manual shall be provided</li> <li>• Interconnections <ul style="list-style-type: none"> <li>- All interconnections are made using 2mm banana Patch cords.</li> <li>- Test points are provided to analyze signals at various points.</li> <li>- All ICS are mounted on IC Sockets.</li> <li>- Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>- In-Built Power Supply with Power ON indication</li> <li>- Attractive Wooden enclosures of Light weight Australian Pine Wood.</li> <li>- Set of 2mm Patch cords for interconnections.</li> </ul> </li> </ul>	
3	<b>AC POSITION CONTROL LAB KIT(Including installation and demonstration)</b>  <b>List of Experiments</b> <ul style="list-style-type: none"> <li>• Error detector characteristics, phase reversal.</li> <li>• Amplifier gain measurement</li> <li>• Phase difference between control and reference windings.</li> <li>• Step response study.</li> </ul>	<ul style="list-style-type: none"> <li>• 2-phase servomotor 12V/ phase, 50Hz, 10W.</li> <li>• Power amplifier.</li> <li>• Servo potentiometer type error detector.</li> <li>• In-built 10.00V (rms) panel meter.</li> <li>• µP based waveform capture card.</li> <li>• User manual shall be provided.</li> <li>• Lab kit shall be suitable for satisfactory operating at 1-phase, 240V AC supply.</li> <li>• Interconnections <ul style="list-style-type: none"> <li>- All interconnections are made using 2mm banana Patch cords.</li> <li>- Test points are provided to analyze signals at</li> </ul> </li> </ul>	02

		<ul style="list-style-type: none"> <li>various points.</li> <li>- All ICS are mounted on IC Sockets.</li> <li>- Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>- In-Built Power Supply with Power ON indication.</li> <li>- Attractive Wooden enclosures of Light weight Australian Pine Wood.</li> <li>- Set of 2mm Patch cords for inter-connections</li> </ul>	
4	<b>AC SERVOMOTOR STUDY LAB KIT (Including installation and demonstration)</b>  <b>List of Experiments</b> <ul style="list-style-type: none"> <li>• Inertia and function parameter.</li> <li>• Time Constant.</li> <li>• Transfer function.</li> </ul>	<ul style="list-style-type: none"> <li>• 2-phase a.c. servomotor – 12V/50Hz per phase.</li> <li>• Small generator for loading.</li> <li>• 4-digit speed display.</li> <li>• 3-digit time constant display.</li> <li>• 3 ½ digit r.m.s. voltmeter.</li> <li>• 3 ½ digit d.c. panel meter.</li> <li>• Lab kit shall be suitable for satisfactory operating at 1-phase, 240V AC supply.</li> <li>• User manual shall be provided</li> <li>• Interconnections <ul style="list-style-type: none"> <li>- All interconnections are made using 2mm banana Patch cords.</li> <li>- Test points are provided to analyze signals at various points.</li> <li>- All ICS are mounted on IC Sockets.</li> <li>- Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>- In-Built Power Supply with Power ON indication</li> <li>- Attractive Wooden enclosures of Light weight Australian Pine Wood.</li> <li>- Set of 2mm Patch cords for interconnections</li> </ul> </li> </ul>	02
5	<b>SYNCHRO TRANSMITTER &amp; RECIEVER LAB KIT (Including installation and demonstration)</b>	<ul style="list-style-type: none"> <li>• The input angular displacement displayed on anodized dial.</li> <li>• The output angular displacement displayed</li> </ul>	2



<p><b>List of Experiment</b></p> <ul style="list-style-type: none"> <li>• Basic characteristics study - stator voltages as a function of the rotor angle using the built-in ac voltmeter.</li> <li>• Operation and error study of the transmitterreceiver pair as a simple open loop position control at a very low torque.</li> <li>• Plotting the error voltage output as a function of the transmitter rotor angle with the receiver rotor locked.</li> <li>• Use of balanced demodulator to develop dc error signal with appropriate polarity and compare it with the ac error</li> </ul>	<p>on anodized dial.</p> <ul style="list-style-type: none"> <li>• Two rotor terminals (R1 &amp; R2) three stator terminals (S1, S2 and S3) are brought out on the front panel.</li> <li>• Synchro transmitter-receiver pair with calibrated dials provided in Metal Sea through enclosure.</li> <li>• Locking system for receiver rotor</li> <li>• Receiver use as control transformer</li> <li>• Built-in balanced demodulator circuit Panel meter for ac/dc voltages</li> <li>• Lab kit shall be suitable for satisfactory operating at 1-phase, 240V AC supply.</li> <li>• User manual shall be provided</li> <li>• Interconnections <ul style="list-style-type: none"> <li>- All interconnections are made using 2mm banana Patch cords.</li> <li>- Test points are provided to analyze signals at various points.</li> <li>- All ICS are mounted on IC Sockets.</li> <li>- Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>- In-Built Power Supply with Power ON indication</li> <li>- Attractive Wooden enclosures of Light weight Australian Pine Wood.</li> <li>- Set of 2mm Patch cords for interconnections</li> </ul> </li> </ul>	
<p><b>COMPENSATION DESIGN LAB KIT (Including installation and demonstration)</b></p> <p><b>List of Experiments</b></p> <ul style="list-style-type: none"> <li>• Lag/Lead compensation in the frequency</li> </ul>	<ul style="list-style-type: none"> <li>• Simulated 'uncompensated' system having adjustable damping. Peak percent overshoot <math>M_p</math>, variable from 20% to 50%, and steady state error variable from 50% to 0.5%.</li> </ul>	02

<p>domain.</p> <ul style="list-style-type: none"> <li>• Lag/Lead compensation in the s-plane.</li> <li>• All the above design problem may be undertaken for a very wide range of design specifications.</li> <li>• The implementation of the compensation network has been made very convenient by a rewired amplifier with calibrated gain.</li> </ul>	<ul style="list-style-type: none"> <li>• Compensation network implementation through built-in variable gain amplifier. Gain is adjustable from 1 to 11.</li> <li>• Built-in square and sine wave generators for transient and frequency response studies. Frequency adjustable from 25Hz 800Hz (approx).</li> <li>• Lab kit shall be suitable for satisfactory operating at 1-phase, 240V AC supply.</li> <li>• User manual shall be provided</li> </ul>	
	<ul style="list-style-type: none"> <li>• Interconnections <ul style="list-style-type: none"> <li>- All interconnections are made using 2mm banana Patch cords.</li> <li>- Test points are provided to analyze signals at various points.</li> <li>- All ICS are mounted on IC Sockets.</li> <li>- Bare board Tested Glass Epoxy SMOBC PCB is used.</li> <li>- In-Built Power Supply with Power ON indication</li> <li>- Attractive Wooden enclosures of Light weight Australian Pine Wood.</li> <li>- Set of 2mm Patch cords for interconnections</li> </ul> </li> </ul>	TOTAL

Department : CIVIL Engineering Department(Lab Equipment urgently required) *U.P. Govt*

Item Name	Item Description	Item Quantity
UV Spectrophotometer	Micro controller based, Single beam, Wavelength range 190-1100nm	1
DO Meter	For measuring Oxygen demand Professional two-channel meter for the parallel determination of pH, ion concentrations, mV/redox or rel. mV and dissolved oxygen (optical RDO <sup>®</sup> technology)	1
Turbidity Meter	For measuring Turbidity Range 0.00 to 9.99; 10.0 to 99.9; 100 to 1000 NTU Method ratio nephelometric method (90° & 180°) Measuring Mode normal, average, continuous Turbidity Standards < 0.1, 15, 100, and 750 NTU Calibration two, three, or four-point calibration	1
pH Meter	For measuring pH <ul style="list-style-type: none"> <li>Graphic display with on-screen instructions</li> <li>50-set memory (pH, temp, date and time stamp)</li> <li>Automatic calibration and buffer recognition</li> <li>IP67 waterproof housing</li> <li>User-replaceable single- or double-junction electrodes</li> </ul>	1
Conductivity Meter	For measuring Conductivity Meter Type:Portable Display type:Analog Conductivity Accuracy:±2% FS	1
Muffle Furnace	For Volatile Matter Max. Temperature 1450°C Working Temperature 1350°C Heating Element Silicon Carbide (SiC)	1



Flame Photometer	Determination of Na, K Range : Na, K, & Li :1-100 ppm and Ca:15-100 ppm Sensitivity : Na, K, & Li :0.5 ppm and Ca:15 ppm Linearity : < 3% Reproducibility : 2% CV for 20 samples Detector : Photo Cell	1
Autoclave	For sterilization Chamber Dimensions $\varnothing \times L$ (mm) 384 x 758 Chamber Volume (Liters) 85L No. of Trays 2 Tray Dimensions W x H x D (mm) Small: 286 x 25 x 675 Large: 350 x 25 x 675	1
Water sampler	For collecting water samples	1
Water Bath	For heating samples	1
Ductility test apparatus with BRIQUETTE Mould	: IS 1208, refrigerated ductility testing machine with processor based temperature and speed controller .consisting of three mould assemblies on a base plate . a water bath of 10 L capacity with a perforated shelf for and a thermostat controller for heater. The machine has two standard rate of travel of 1 cm per minute and 5 cm per minute the movable bracket can be arrested or released without switching of the motor by a clutch arrangement suitable for operation on 220 V single phase	1
Ring and Ball apparatus	: IS 1205 , consist of 2 steel balls (9.5 mm dia ,wt 2.5 g ),two tapered rings in brass ,two ball centering guides ,a ring holder and a bath 8.5 cm dia x 12 cm deep approx..	2 (Rs 10000 each)
Thickness Gauge and Length Gauge ( shape test)	IS 2386 (part 1) 1963,thickness gauge consist of a panel having accurately cut slots of different standard length and widths. Length gauge consist of metal plate on which 8 steel pins are vertically mounted with specified distances in between. This assembly is mounted on a hard wood base.	2(Rs 10000 each)
Flash and fire point apparatus (pensky martens )	: IS 1448(part 1) 1209 consist of brass coil cup fitted with a heat resistance handle. The cup is provided with a lid which include stirring device, a cover ,shutter and a flame explosive device with a hot plate with energy regulator.	1
Penetrometer digital (penetration test apparatus )and water bath	penetrometer digital: electronic penetrometer with a digital gauge.Water bath : specification : a thermostatically controlled containing not less than 10 L of water maintained at 25 C	1
Electric heater	Single burner	1

17	Film stripping device (electrically operated )	consist of a disk on with four bottle are mounted with the rotation speed of 100 rpm approx.	1
18	Loss angles abrasion test machine with all accessories	: electrically operated on 415V, 3 phase ,50 Hz AC supply	1