MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

No. F5(865)ST/MNIT/EE/2021 **Phone : 0141-2713312,2713352**

NOTICE INVITING QUOTATIONS

Registrar, MNIT, JLN Marg, Jaipur invites sealed tenders for the supply of **"Equipments"** for **Measurement and Instrumentation Lab** for **Electrical Engineering Department** of this Institute in **Two Bid System (Technical & Financial bids in separate envelop)** as per schedule given below.

Event	**Date & Time**
Download of Tender	07.01.2022
Pre-Bid Meeting Date & Time	17.01.2022 by 2.00 PM
Bid Submission Last Date& Time	28.01.2022 by 2.00 PM
Technical Bid Opening Date & Time	28.01.2022 at 3.00 PM
Financial Bid Opening	Will be intimated later on
Earnest Money	Rs. 60,000/- in the name of The Registrar, MNIT and payable at Jaipur **(Kindly attached the RTGS details with cancelled cheque along with the Earnest Money)**

Quotation must be enclosed in a properly sealed envelope address to the MNIT, Jaipur with kind attention to **Deputy Registrar (S&P), MNIT, Jawahar Lal Nehru Marg, Jaipur -302017** (E-mail address storepurchase@mnit.ac.in) by designation and not by name. The quotations must be super scribed "Quotations for the supply of **Equipment** ---------- as called for in Tender Notice No. ---------- dated _____"DUE ON--------- AT ----------AM/PM. The Quotation must reach on or before -------AM/ PM on or before the due date and time mentioned in the tender notice/tender document. The documents must be dropped in the tender box available in Central Store during office hours (9.30am to 6.00pm) on all working days. Bids delivered to any other place or any individual shall not be considered as valid document. Quotations sent by e-mail will not be considered valid. The complete Tender document can be viewed and downloaded only from the website (www.mnit.ac.in) and CPPP site https://eprocure.gov.in/epublish/app during the tender period.

GENERAL TERMS & CONDITIONS

1. **THE RATES QUOTED SHOULD BE F.O.R. JAIPUR inclusive of all charges related to transportation from your end to MNIT, Jaipur in Indian rupees. For imported items, the rates are to be quoted CIF(Cost, Insurance & Freight) Delhi only in freely convertible foreign currencies. In case the rates are quoted CIF (Cost, Insurance & Freight) New Delhi, then it will be the responsibility of the supplier to intimate us well in advance prior to dispatch and submission of all the relevant documents in time which will be required in clearing the consignment from Custom. If, there is delay in sending the documents and demurrage is imposed, then it will be in the account of foreign supplier. Kindly note that if any amendment is required in LC, after its establishment, the Bank Charges in this respect will be in the account of beneficiary only.** Bid shall always be both in the figures and words. The words "No quotations" should be written across any or all of the items in the schedule for which a tender does not wish to tender.

2. As far as possible, bid should be given for goods of India manufacture which are readily available. Foreign goods quoted and proposed to be supplied should be covered by normal import quota of the dealer. This institute is exempted from payment of custom duty.

3. Detailed specifications and "make" of each item should be clearly given supported by the illustrated pamphlets wherever possible. Bid without specifying the make and other particulars may be rejected. The accessories included in the equipment should also be clearly mentioned.

4. Losses or damage in transit will be in to the account of the supplier in case of rates **F.O.R. JAIPUR.** The supplier may, if he so desires, get the goods insured

5. The payment for the ordered items would be made after the articles have been received, found in order and its successful installation.Payment will be made by RTGS to indigenous suppliers. Kindly send the RTGS details and cancelled cheque along with the Invoice.**The payment to foreign supplier will be made through FDD/Wire Transfer OR Letter of Credit as the case may be. However 90 percent payment will be released after receipt of items and remaining 10 present after its successfully installation**

6. Your rates should be valid at least for three months (minimum) from the last date of opening of bid.

7. All legal proceedings, if necessity arises to institute may be any of the parties (Institute or Contractor/Supplier) shall have to be lodged in the courts situated at Jaipur and not elsewhere.

8. The institute is not bound to accept the lowest tender and may reject any tender or any part of the tender without giving any justification for such an action.

9. (a) The Penalty Clause is as under:-

If the seller fails to deliver any or all of the Goods/Services within the original /re-fixed delivery period specified in the Purchase Order, this Institute will be entitled to deduct/recover the Liquidated Damages for the delay at the following percentage:

(i)	Delay up to one month		1%
(ii)	Delay exceeding one month but not exceeding two month		2%
(iii)	Delay exceeding two month but not exceeding three month		5%
(iv)	Delay exceeding three month		5% for each month and part there of subject tomaximum 10%

(b) In case of failure to supply the goods within the prescribed time and in accordance with the specifications give in the Quotations, the institute shall be free to cancel the order and make purchases from the next higher tenderer or from the open market as the case may be. In that case the loss sustained by the institute shall be recovered from the defaulting supplier. The institute will be at liberty to recover the loss from the permanent earnest money/or any other pending claims of the supplier without prejudice to its general right to affect recovery from the supplier.

10. The prospective bidders can be those who are the manufacturers of the equipment. For items manufactured outside India, the manufacturer itself can be a bidder or its authorised Indian agent can bid on behalf of its Principal that is the manufacturer.

11. In the event, the country of origin of goods is India, only the manufacturers shall be considered eligible for bidding. Authorised agents of Indian manufacturers may be permitted to submit the bid, provided the concerned manufacturer states that as its policy, it does not bid itself in India and that there is no qualitative difference between manufacturer and its agent as bidder in respect of quality of supplies, cost, and responsibility of maintenance and servicing. The Indian manufacturer must describe the alternatives in clear terms, in the event the bidding agent ceases to continue as agent of the concerned manufacturer within the stipulated warrantee period.

12. If any Indian manufacturer requires importing an essential part from a foreign country, the said company may be given to enjoy the benefit of customs duty exemption with the aid of CDEC of MNIT, Jaipur provided the import of the concerned item is done on behalf of MNIT, Jaipur.

13. **THERE IS TWO BID SYSTEM:-**

(TECHNICAL AND FINANCIAL BID, both bids should be submitted in separate envelopes):

(A) Technical Bid:

a) Bidder must be a manufacturer/authorized distributor/ Dealers and they have to enclose a certificate of authorization of manufacturer in format at **Annexure – A (Authorization certificate in any other format will not be valid).**OEM itself or any one authorised dealer on behalf of OEM may participate in bid. OEM and its dealers both may not participate at the same time.

b) The manufacturers should supply documentary proof i.e. Registration with the Registrar of Industries, National Small Scale Industries Corporation or with penal of MNIT in case of manufacturer. Offers other then the manufacturers should be supported with an authority letter from the manufacturers, authorizing them to quote rates standing guarantee for the satisfactory execution of supply orders failing which offers are liable to be ignored.

c) One declaration by the Manufacturer to the extent that in case of failure of its local agent /office to provide service support to the satisfaction of MNIT Jaipur, it shall make immediate arrangement for required service support.

d) **Bidder should enclose technical compliance from the Manufacturer. The specifications of items should be strictly as specified. Deviation, if any may please be mentioned separately. If there is no deviation than it should be mentioned as "No Deviation".**

e) The leaflets catalogue, related to quoted equipment/model etc. should be sent invariably, so that a proper evaluation of the equipment offered is possible.

f) Mention must be made of the pre-installation requirements for the equipment quoted viz. ambient temperature, humidity, weather specifications, power specifications, civil works etc. When items are provided full performance satisfaction should be demonstrated.

g) Bidder must enclose the acceptance of terms and conditions and must enclose the duly signed and stamped tender document.

h) All the Annexure enclosed should be duly filled up and signed.

i) Please attach proof/certificate of each condition required in the tender document.

j) The firm should provide approximate area required for the setting/installation of the machine / equipment.

k) Installation support and demonstration for utilizing the equipment is also needed

l) To mention, if any additional setup/infra is required before installation of equipment (esp. Foundation etc. For larger m/c)

m) Bidder shall enclose Earnest Money Deposit (EMD)

(B) Financial Bid:

a) The rates to be quoted by the bidder should be clearly mentioned without any overwriting

b) If there is any cutting in the price box, issued be duly signed

c) The bidders should clearly mentioned their payment terms & conditions

d) The GST or any other taxes including Custom duty Etc. should be mentioned clearly

14. **Delivery Period:-**The ordered quantity of stores must be delivered within 12 to 14 weeks in the case of indigenous equipment and 14 to 16 weeks in the case of imported equipment after opening of L.C. / FDD and Wire Transfer. The extention of delivery period after placing the PO, if required, will be considered only on genuine reasons and proper justifications only.

15. **Installation**: - Successful BIDDER shall depute concerned specialist, for supervision of erection& commissioning of the machine to be carried out as and when necessary. The successful BIDDER

shall make necessary arrangements during the entire warranty period at their own expenses for stay, transport and other expenses of their specialist during their stay in Jaipur;

16. **Warranty:** All the bidders are required to provide minimum **01 Year + 60 Days** warranty on the quoted equipment / instrument

17. **Performance Bank guarantee**

Successful Bidder has to Provide Performance security @ **10%** of the equipment cost, valid for stipulated warranty period plus 60 days which should be in the form of Bank's Guarantee from a commercial bank in format at **Annexure – B**. Warranty will cover repair/replacement of all defective parts, if any, with the same or equivalent make for any part removed. Maintenance will be provided at site. The supplier will provide after sale service during the warranty period from nearest place to installation. The supplier will attend the complaint within 24 working hours and not beyond 5 working days.

18. **EARNEST MONEY**: A Demand Draft of Rs.**60,000**/- from a Commercial bank only in the name of the Registrar, M.N.I.T. and payable at Jaipur may please be sentalong with your tender as Earnest Monay**No tender shall be considered without earnest money / tender fee. Cheques are not accepted as earnest money amount.** No interest is payable by us on the amount of earnest money. **Kindly attach the RTGS details with cancelled cheque along with the Earnest Money.** The firms registered with NSIC/MSME are exempted for furnishing of EMD / Tender Fee. The Hard copy of NSIC/MSME registration certificate is to be enclosed in technical bid positively.

19. **Jurisdiction:**The Courts of Jaipur alone will have the jurisdiction to try any matter, dispute or difference between the parties arising out of this tender/contract. It is specifically agreed that no Court outside and other than Jaipur court shall have jurisdiction in the matter.

20. **Arbitration Clause: - In the eventuality of any dispute, the sole Arbitrator shall be MNIT, Jaipur and his decision shall be binding on all the parties.**

21. **Force Majeure** : Any failure of omission or commission to carry out the provision of this contract by the supplier shall not give rise to any claim by one party, one against the other, if such failure of omission or commission arises from an act of God; which shall include all acts of nature calamities such as fire, flood, earthquake, hurricane, or nay pestilence or from civil strikes, compliance with any statute and / or regulations of the Government, lockouts and strikes, riots, embargoes or from any political or other reason beyond the supplier's control including war (whether declared or not) civil war or stage of insurrection, provided that notice of the occurrence of any event by either party to the other shall be given within two weeks from the date of occurrence of such an event which could be attributed to Force Majeure conditions.

22. **Risk &Cost** : In the event of failure to carry out the contractual obligations, within the stipulated period or extended period and determination of the contract for any reason, violation of warranties etc. the MNIT Jaipur shall have the right to carry out the unfinished obligation at the exclusive - cost and risk of the bidder/firm, after due notice and the difference so accrued shall be recoverable from the bidder/firm.

23. The material found defective upon opening by the supplier representative in presence of Central stores personnel / indenter of MNIT Jaipur or not as per tendered specifications will have to be lifted back by the supplier at their own cost and risk. The material lying in MNIT Jaipur premises would be at supplier's risk and cost.

24. **Custom Duty :** The MNIT, Jaipur is a public funded research Institution registered with Department of Scientific & Industrial Research and concessional Custom Duty @5.15% is applicable for the goods purchased for research purpose vide Government of India Notification No.51/96-Customs dated 23.07.1996

25 **GST:**MNIT, Jaipur is a public funded research Institution registered with Department of Scientific & Industrial Research for concessional GST @5% applicable for the goods purchased for research purpose vide Ministry of Finance (Department of Revenue) Notification No.47/2017-Integrated Tax dated 14.11.2017 & Notification No.45/2017-Central Tax dated 14.11.2017.

26. **Bid Validity:** 90 days (Minimum)

27. **Opening of Bids:** The Bids shall be opened by authorised officials of the institute as per schedule given in Date Sheet.In case, the day of bid opening is declared a holiday by the government, the Bids will be opened on the next working day at the same time. No separate intimation shall be sent to the bidders in this regard.Only opening of bids and accepting the bid will not mean that the firm is technically or financially qualified.

28. **Institute right to vary Quantities at Time of Award or later** : Institute reserves the right at the time of awarding the contract to increase or decrease the quantity of goods and services originally mentioned in our NIT without any change in unit price or other terms and conditions.

29. While submitting the tender, the **GST Registration No**., **PAN No.**&**E-mail Address** is to be mentioned by the bidder positively. Failing this, there bid will be treated as non responsive.

30. **After Sales Service Certificate :**After sales service certificate is to be furnished by successful bidder in the prescribed form as **annexure –C**

31. **PREFERENCE TO MAKE IN INDIA:**

This Order is issued pursuant to Rule 153 (iii) of the General Financial Rules 2017

Public Procurement (Preference to Make in India), Order 2017 and Public procurement policy for micro and small enterprises (MSEs) as per guideline shall be applicable. For details visit website: www.msme.gov.in

a. In reference to the Govt. of India fresh initiative "Atmanirbhar Bharat" only items with minimum 20% domestic value addition / local content can participate in public procurement unless global bid are invited. Also items with more than 50% local content will get purchase preference over other items.

Local content means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a

proportion of the total value, in percent. Bidder has to mentioned whether they fall in Class-I local supplier, Class-II or Non – Local supplier.

Class-I local supplier, means a supplier or service provider, whose goods, services or works offered for procurement, has local content equal to or more than 50%.

Class-II local supplier, means a supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%.

Non-Local supplier, means a supplier or service provider, whose goods, services or works offered for procurement. Has less than or equal to 20%.

Verification of Local Content:-

The Class-I local supplier / Class-II local supplier, shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for Class-I Local supplier / Class-II local supplier, They shall also give details of the locations (s) at which the local value addition is made.

The above mentioned documents at Sl. 1. (i), (ii) are to be submitted along with bid positively.

32. Specification Enclosed as annexure – D

Deputy Registrar
(Store & Purchase)

Annexure - A

MANUFACTURERS' AUTHORIZATION FORM

[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer.]

Date : [insert date (as day, month and year) of Bid Submission]

Tender No. :[insert number from Invitation For Bids]

To : [insert complete name and address of Purchaser]

WHEREAS

We [insert complete name of Manufacturer],who are official manufacturers of [insert type of goods manufactured], having factories at [insert full address of Manufacturer's factories], do hereby authorize [insert complete name of Bidder]to submit a bid the purpose of which is to provide the following Goods, manufactured by us [insert name and or brief description of the Goods],and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 2.20 of the General Conditions of Contract, with respect to the Goods offered by the above firm.

Signed: [insert signature(s) of authorized representative(s) of the Manufacturer]

Name: [insert complete name(s) of authorized representative(s) of the Manufacturer]

Title: [insert title]

Duly authorized to sign this Authorization on behalf of: [insert complete name of Bidder]

Dated on _____ day of _____, _____ [insert date of signing]

*(Not required in case the bidder itself is the manufacturer)

Annexure - B

PERFORMANCE BANK GUARANTEE

(To be executed on Stamp Paper of Rs. 100/- or such higher value as per the Stamp Act of the State in which the Guarantee is issued. Stamp Paper should be in the name of the Bank Issuing the Guarantee.)

BANK GUARANTEE NO. :
DATED :

Dear Sirs,

1. THIS DEED OF GUARANTEE made on this ..... day of..... …….. between**MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY, JAIPUR** (hereinafter called the "**MNIT"** which expression shall unless excluded by or repugnant to the context includes its successors and assignees) of the one part and the ..... (hereinafter called the **"Bank"** which expression shall unless excluded by or repugnant to the context include its successors and assignees) of the other part.

2. AND WHEREAS as per clause _____ of the purchase order in question the supplier shall furnish a Performance Bank Guarantee of 3% of P.O. Value i.e. Rs. …….. (Rs..... ..... only) valid for the period of two months beyond warranty period as and by way of security for satisfactory working of the ……..... .... AND WHEREAS at the request of the supplier, the Bank executes these presents.

3.0 THIS DEED WITHNESSETH AND IT IS HEREBY AGREED AND DECLARED BY AND BETWEEN PARTIES HERETO AS FOLLOWS:

3.1 The Bank hereby guarantees to the MNIT, Jaipur that the equipment / service contracted are capable of performing the work as demanded by the MNIT, Jaipur. In the event of equipment / service failing to perform to the satisfaction of the MNIT, Jaipur, which shall be final and conclusive of the factum of non-performance, the Bank shall indemnify and keep the indemnified to the extent of ..... of P.O. Value i.e. Rs. ..... (Rupees ....) valid for the period of two months beyond the warranty period against any loss or damage that may be caused to or suffered by the MNIT, Jaipur consequent to non-performance of the contracted equipment / services to be supplied by the supplier.

3.2 In consideration of the aforesaid premise and at the request of the supplier, we the Bank hereby irrevocably and unconditionally guarantee that the supplier shall perform in an orderly manner their contractual obligations in accordance with the terms and conditions set forth in the Purchase order dated ..... and in the event of the supplier's failure to do so, the Bank unconditionally pay to the MNIT, Jaipur on demand, any amount up to the value mentioned in Clause 3.1 above without any reference to the supplier and without questioning the claim.

3.3 The guarantee herein shall remain in full force for a period of two months beyond the warranty period from the date of certification by the MNIT, Jaipur of successful installation and commissioning of the equipment/ service contracted. Date of start of warranty period will be notified by MNIT, Jaipur to the Bank.

3.4 The decision of the MNIT, Jaipur regarding the liability of the Bank under the guarantee and the amount payable there under shall be final and conclusive and binding on us without

question. The Bank shall pay forthwith the amount demanded by the MNIT, Jaipur not withstanding any dispute, if any, between the MNIT, Jaipur and the supplier.

3.5 The Bank further agrees that the guarantee herein shall remain in full force during the pendency of aforesaid period mentioned in Clause 3.3 above and also any extension of the guarantee which has been provided by the Bank for this purpose beyond the aforesaid period provided, further, that if any claim accrues or against the Bank by virtue of this guarantee, should be lodged with us within a period of 60 days from the date of expiry of the guarantee period.

3.6 This Guarantee shall not be affected by any change in constitution of the supplier, MNIT, Jaipur or us not shall it be affected by any change in constitution or by any amalgamation orabsorption or reconstruction thereof otherwise, but will ensure for and be available to and endorsable by the absorbing amalgamated company or concern.

3.7 The MNIT, Jaipur has the fullest liberty without affecting the guarantee to postpone at any time or from time any of the powers exercisable by it against the supplier, either to enforce or forbear the clause governing guarantee in the terms and conditions of the said contract and Bank shall not be released from its liabilities under the guarantee by any matter referred to or by reason of time being given to the supplier or any other forbearance, act or omission on the part of the MNIT, Jaipur or any material or things whatsoever which under the law relating to sureties shall but for the provisions hereof have the effect of so releasing the Bank from its liabilities.

3.8 We further agree that the MNIT, Jaipur shall have the fullest liberty without affecting in any way our obligations hereunder with or without our consent or knowledge to vary any of the terms and conditions of the said contract or to extend the time of delivery from time to time.

3.9 The Bank undertakes not to revoke this guarantee during its currency except with the previous consent in writing of the MNIT, Jaipur.

3.10 We further agree that in order to give full effect to the guarantee herein contained MNIT, Jaipur shall be entitled to act as if we were its principal debtors in respect of its claim against the Supplier hereby guaranteed by us as aforesaid and we hereby expressly waive all our rights of suretyship and other rights if any which are in any way inconsistent with the above provision of this Guarantee.

Notwithstanding anything herein before, liability of the Bank under this guarantee is restricted to Rs. ..... (Rupees ..... only) and it will remain in force up to the period specified in Clause 3.3 unless a suit to enforce any claim under the Guarantee is filed against the Bank before the period specified in Clause 3.4. All your rights under this Guarantee shall be forfeited and we shall be relieved and discharged from all liabilities thereunder.

COUNTERSIGNED

Signature	:	Signature	:
Name	:	Name	:
Designation	:	Designation	:
Organization	:	Organization	:

Annexure – C

AFTERSALE SERVICE CERTIFICATE

From:

To

The Registrar,
Malaviya National Institute of Technology (MNIT),
Jaipur

Whereas, we M/s (Bidder Name) are established & reputable manufacturers (Make of items) of [items name] having service offices at Delhi, Jaipur and in the state of Rajasthan. Details are as under:

Sr.No.	Address of Service Centre	Phone No.	Number of Engineers
1.			
2.			
3.			

We do hereby confirm that:

Services including repair/replacement of defective parts will be done by us. Replacement of defective Systems/parts will be done by equivalent or better systems/parts of the same make. We will attend all the complaints/service calls within 24 working hours and not beyond 5 working days. Down time will not exceed beyond 5 working days. In case, down time exceed 5 working days then we will extend the warranty period of that item(s) double of the down time.

(Signature)

Name :

Designation :

(Head or Senior Executive of Firm)

Address :

Phone No :

Fax No:

Mobile No :

Annexure –D

S.No.	Name of fixed Assets/Equipment	Quantity
1	**Hall effect Sensor based on AC/DC Current and DC Voltage Measurement Experimental Setup Trainer** • AC/DC current hall sensor (x 2nos.) • Closed Loop current measurement using Hall sensor. • DC Voltage transducer. • Field failure/zero current detector. **Specifications:** **AC/DC current hall sensor (x 2nos.):** Max. I/P upto 20A, 50/60Hz, Isolation = 2.1KV, Proportional O/P = 0 - 2.5V, 1 CH Optional. **DC Voltage transducer (x2 nos):** Using high speed opto coupler IC (max. up to 600Vdc), isolation = 2 KV, 1 CH Optional. Function Blocks Used : Precision rectifier (x 2 nos) with gain = 5, LPF (x2nos) with gain = 2, Span Zero Circuit to interface with ADC(0-2.5Vdc) for both current and voltage, only 1 functional block each supplied, 2nd optional, Field failure/zero current detector.	02
2	**Digital Storage Oscilloscope** • InfiniiVision 1000 X-Series Oscilloscope with WaveGen, 4 Ch, 100 MHz, upgradeable to 200 MHz Specifications: Bandwidth: 100 MHz Bandwidth Upgradability: Same instrument should be capable to upgrade till 200MHz in future. Number of Channel: 4 Analog Channel Maximum Sample Rate:1 GSa/s on all channel Memory Depth: 1 Mpts or higher Waveform Update rate: ≥ 200,000 per second or higher Function Generator: 20MHz function Generator Includes Bode Plot Features (Waveform Sine Square ramp, Pulse, DC, Noise) Frequency Range: Sine Wave (0.1Hz to 20MHz) and Square, pulse wave (0.1Hz to 10MHz) Amplitude: 2mVpp to 20Vpp into Hi Z and 1mVpp to 10Vpp into 50Ω.With AM, FM & FSK modulation feature should be available. Serial Protocol analysis: Should have Standard I²C, SPI, UART/RS-32, CAN ,LIN protocol analysis feature Vertical Sensitivity: 500µV/Div to 10 V/div Vertical Resolution: 8 Bits Time Base Accuracy: 50ppm. Display: ≥7 inch Passive Probes: 4 Passive Probe should be provided with oscilloscope and have selectable 10:1 and 1:1 attenuation. Warranty: Should have standard 3 Years warranty with 5 years calibration interval	01

3	**DC power supply, triple-output, 6 V, 5 A and 2 x 30 V, 1 A, 90 W: LAN, USB** **Specifications:** Number of Output: 3 DC power Output (Watt): 90W Output Voltage Range for DC Power Supply (V): 0 to 6V 5A, 0 to 30V,1 A and 0 to 30V ,1 A Load and Line Regulation: Voltage: < 0.01% + 2 mV Current: < 0.2% + 10 mA Programming accuracy Voltage: 0.1% + 5 mV at 5V/0.05% + 10 mV at 30V Current: 0.1% + 10 mA at 5A/0.2% + 5 mA at 1A Readback accuracy Voltage: 0.1% + 5 mV at 5V/0.05% + 10 mV at 30V Current: 0.1% + 10 mA at 5A/0.2% + 5 mA at 1A Load transient recovery time: <50 uS Output ripple and noise (20 Hz to 20 MHz) Normal Mode Voltage: <1mVrms/5mVpp Output ripple and noise (20 Hz to 20 MHz) Normal Mode Current: < 4 mArms Display: 7-inch large WVGA color display to display the voltage and current for all three channels with different views. Interface: USB, LAN with compatible PC software makes it simple to connect and control, See measurement value in voltage, current, power and output status. Use the intuitive output limit-setting and control. Log data, capture screenshots, and save a system's current state. Export measurement data in the desired format quickly Individual knobs for voltage and current Superior over-voltage, over-current, and over-temperature protection Warranty: Should have standard 3 Years warranty.	02
4	**Waveform / Function generator, 20 MHz, 2-channel** **Specifications:** Number of channels: 2 Frequency Range: Sine: 1 µHz to 20 MHz with resolution of 1µHz Square & Pulse: 1 µHz to 20 MHz with resolution of 1µHz Standard waveforms: Sine, square, ramp, pulse, triangle, Gaussian noise, pseudorandom binary sequence (PRBS), DC Built-in arbitrary: Cardiac, exponential fall, exponential rise, Gaussian pulse, haversine, Lorentz, D-Lorentz, negative ramp, sinc Amplitude range: 1 mVpp to 10 Vpp into 50 Ω, 4-digit resolution 2 mVpp to 20 Vpp into open circuit, 4-digit resolution Resolution: 16 Bits Modulation types: Amplitude modulation (AM), frequency modulation (FM), phase modulation (PM), frequency shift keying (FSK), binary phase shift keying (BPSK), pulse width modulation (PWM) Resolution and sampling rate: 16 bits/250 MSa/s Sweep: Linear, Logarithmic and frequency list Sweep Direction: Up and Down Total harmonic distortion and jitter: <0.075% THD and <2.5ns jitter (RMS) Parameter coupling: None, frequency (ratio or difference) and / or amplitude and DC offset Relative phase: 0° to 360°, 0.1° resolution with crosstalk of < -75 dB	02

	Display: Large 7inch WVGA color display for a simultaneous parameter set up, signal viewing Interface: USB, LAN with compatible PC software makes it simple to connect and control your function generators, load custom arbitrary waveforms from files Warranty: Should have standard 3 Years warranty	
5	**Digital Multimeter, 5.5 digit** • Digital multimeter should have benchtop form factor with more than 10 input measurement capability includes: DC voltage, DC current, true RMS AC voltage, AC Current, two- and four-wire resistance, frequency, continuity, diode test, temperature, and capacitance • Basic DC accuracy 0.03% • Should have 7-inch dual-measurement color display and reading rate of up to 110 readings/s for speed-critical measurements • 5,000 points logging memory for recording more data and perform analysis • USB and LAN for flexible PC connectivity and USB flash drive support to copy / load configuration for repeated test setup • Includes software for PC connectivity, remote control and data logging capability **Specifications:** Voltage : DC Voltage: 100mV to 1000V AC Voltage: 100mV to 750V Current: DC Current: 10mA to 3 A AC Current: 10mAto 3 A Resistance: 2 – Wire & 4 – Wire Resistance: 100Ω to 100 MΩ Capacitance: 1 nF to 10mF Frequency & Period: 20 Hz to 300 KHz Continuity & Diode: Yes, 1V Max. Reading Rate: 110 rdgs/s Memory: Standard 5000 reading, Temperature: Thermistor Display: 7 inch dual-measurement color display Interface: USB, LAN with compatible software to connect and control the instrument and to build custom test sequence with the integrated test flow app to automate and visualize test result, perform unrestricted data logging and statistical analysis Warranty: Should have standard 3 Years warranty	02
6	**Flow/Level process trainer with variable speed pump and pneumatic control valve:** PC based control of flow and level trainer using variable speed pump and pneumatic control valve as well as ratio, cascade and feed forward Control schemes with USB Adaptor. **Technical Specifications (Controller Section):** **Electrical Specifications:** • **Computer Interface panel**: (CIP/PCT1: 4-ADC channels I/P : 0 to 2.5V FS with 1 no input simulation pot, 1 DAC channel O/P 2.5V FS, Connects to PC (P4/XP) parallel port through 25 pin M to F cable / 1.5mtr, I to V function block : I/P 4 to 20mA & O/P 0 - 2.5V and V to I function block : I/P 0 to 2.5V & O/P 0-20 or 4-20mA (100 Ohm load) switch settable) • **Instrumentation Power supply cum Multichannel DPM panel:** (EMT 8: Multi channel DPM for digital display of process parameters, +/-12V/500 mA , +5V/300mA, Unregulated 17V dc/750 mA, line synchronizing signal, 13V / 3 Amp, 20 pin FRC power bus to supply power to neighbouring panels) • **Thyristor Actuator cum signal conditioning panel / CE2 x 2No** (TAP: l Thyristor	01

	bridge based 0-200V/3A using cosine firing circuit, I/P 0 to 2.5Vdc, Supports signal conditioning for RTD, Pressure sensor with Instrumentation Amplifier & flow sensor (water/air) with F to V converter to generate 0-2.5Vdc FS) • **Online monitoring / Data acquisition / PID Software** • **Operating modes** (Simulator Mode, Process Monitoring Mode, PID Controller Mode (parameters: Integral Time Ti (0.01-64000), Sampling Time Ts(0.1-99.9), Derivative Time Td(0-99.9), Proportional Band Pb(1-999), Derivative Gain Kd(1-999), Set Value Rn(0-99.9), PID output Upper Limit Uh(0-99.9), PID output Lower Limit Ul (0-99.9)) • Facility to set units for output (%): V, mm, LPH, kg/cm², ºC. Optionally experiments with advance process control scheme viz; Ratio, Cascade, feedforward with Aux PID, Ratio station & FF transfer function calculator, Alarm setting, ON/OFF control, square root extractor, PWM output, etc. **Process Specifications:** **1. Flow/Level with variable speed pump** Control Valve: Fraction HP universal motor operated variable speed pump driven from TAP (EMT9) panel, I/P 0 to 2.5V O/P 0to195Vdc, Pump Speed : 0-3000RPM , Advance control Expt. Ratio Cascade Feed forward: Transfer function determination, Ziglor Nicholas PID tunning. Between 2 water flows, Inner (fast) loop flow, outer (slow) loop level, Water flow disturbance on level loop, Storage tank material/Capacity: 1 No. 50 itr, plastic/PVC, Bourdon gauges: 0 to 500mm of water column= 1No , Controlled Medium: Water, 1 no. 20 liters, plexiglass (130 X 130 X 700) mm, Electronic sensor Type/Output/ Range: Flow- turbine flow sensors 2 No. Level: WC Pressure sensor 0 to 500mm, level measurement by bubbler method, O/P=0 to 2.5V. Pressure supplied through small compressor & AFR, Rotameter: 2 Nos. Acrylic body 1/2“ size 0 to 200 LPH, Generation & Distribution Pump: 1 No. 0.062KW, 1/12HP, 2800RPM, ½”outlet, 500 LPH Head 9 meters, with brass impeller + 1 no. AC motor pump (8 tr head) for wild flow, Air filter and regulators or accessories: 1 No, 0 to 1 bars, size 1/4”. **2. Flow/Level with Variable Speed Pump Process Control Trainer:** Control valve: Pneumatically operated air to close, linear type, 1/2" size Diaphragm operated, CV = 0.4 with I to P Converter I/P 4 to 20 mA O/P 3 to 15 psi, 2 nos. of Acrylic body ½”size 0 to 200 LPH Rotameter, Control medium: water, Storage tank: PVC with 50Ltr tank, Process tank: PVC with 20 Ltr tank & mounted vertically, Flow Sensor: Turbine Flow Sensors 1 no. + 1 no. Orifice plate with Differential pressure transmitter/sensor, (0-5 PSI), O/P: 0-2.5 V & 0-200 LPH, Generation & Distribution pump: 1 no. 0.062KW, 1/12HP, 2800RPM, 1/2" outlet, 500 LPH. Head 9 meters, with brass impeller, 4 Nos. (0 to 2 bars = 3 nos., 0 to 500mm of water column= 1no.) Bourdon Pressure Gauge, Manual SS valve: 1/2” size =6 nos., 1/4” size = 3 nos, Air Filter & Regulator: 2 nos, 0 to 10 bars, size 1/4”, Oil catcher (1/4” size max. pressure = 10 bars) – 1No. Level Sensor: WC pressure sensor 0 to 500mm with Bubbler method	
7	**Data Acquisition Trainer (DAQ) with SDK (MATLAB and Labview based)** **Specifications:** • l 4 ADC channels: 0 to 2.5V full scale • l 1 DAC channel: O/P 2.5 V/12 V switch selectable (full scale) • l V to I Function block : Input: 0-2.5Vdc, Output: 0 or 4-20mA, upto max.	01

	2Vdc GND compliance • l Extension sockets for digital IOs on CIA II card (8+8 nos) @ TTLlevel • l SDK for MATLAB, Lab view, dotnet c/c++ • l Dlls for USB IO module using MATLAB, Lab view, dotnet c/c++ • 220V / 230V ±10%, 50Hz, 75V • l V to PWM converter : I/P -0 to 2.5V , O/P -1KHz PWM wave @+9V • Adaptor (CIAII): Extension card @TTLlevel having l DC supply +/- 12V@500mA, +5V @1A, l Variable 7V to 14V @ 3Amp. • l Interfaces through USB IO module (HID class) to 25 pin • D(M) connector on CIA panel to PC USB port using: • l 24nos. of TTL Digital I/Os (5V levels) • l 8 nos. of output sockets with LED indicators • l 4 nos. of relays driven from transistorized buffers provided on Digital output right side carrier CPU: Intel Dual core (2.7GHz), Mother board: Intel Chipset, Memory (RAM) - 1GB, Hard disk: Serial ATA (SATA) 250GB, Monitor: LCD 15" Color, Keyboard :PS2 keyboard. Mouse: PS2 Optical Mouse, SMPS 450Watts, CD/DVD R/W drive Controller PC (P4/XP) with parallel port needed should be supplied with the system.	
8	**Instrumentation Amplifier Trainer** Electrical and Electronic System Trainer with OP AMP as Instrumentation Amplifier • Built in Power Supply • DC Supply: 5V / 1A. & ± 12V, 500 mA. • 0 to 15V DC (Variable), 100 mA (Isolated), • 0 to 30V DC (Variable), 100 mA (Isolated), • High Volt DC -15V to 220 V, 100mA. • Onboard DPMs provided with mode/range selection. a. DC volt: 2V/200V - 1No. b. DC current: 2mA/200mA - 1No. c. DC Volts/Current: 20 V/200 mA - 1No. • Onboard moving iron meters provided for • AC Current: 1 AMP - 1No. • AC Voltage: 15V - 1No. • Onboard speaker: 8 Ohms, 0.5 Watt (1No.) • Onboard POTS: 1K - 1No. 1M - 1No. • Operating Voltage: 220/240Vac switch settable ±10%, 50 Hz/72 VA. • AC Supply: 12-0-12V AC, 150 mA. Short circuit Protected. • Data Switches (10 No.) & bi-colour LED status indicators 10X2 Nos, for High/Low indication. • Pulser switches (2 Nos.) with four debounced outputs - 2No. • Optional BNC to 2 channel banana adapter - 2No. • Logic probe to detect High/Low level pulses upto 1MHz, with bi-colour LEDs to indicate status. • 2 / 4 digit 7 segment display with BCD to 7 segment decoder. • Clock Generator: 10 MHz TTL clock. • Built in Function Generator • O/p Waveform: Sine, Triangle & TTL O • Output Frequency: 1 Hz to 1MHz in 6 ranges, with amplitude & frequency control pots. O/P Voltage 20Vp-p max. (Sin/TRG) • Modulation I/P AM: - I/P voltage + 5V (100% modulation) O/P – For 0 V (min), + 5V (max.) - 5V (Phase reversal of O/P) FM: I/P voltage ± 400mV (+ 50% modulation)	01

	Operational Amplifier Circuit Experiment panel (P16): (Provided with 56 banana tags.) Inverting amplifier, Non-inverting amplifier, Summing amplifier, Difference amplifier, Integrator circuit, Differentiator circuit, Precession rectifier: Half wave & full wave, Voltage to current converter, Current to voltage converter, Op-amplifier characteristics, Instrumentation amplifier, Schmitt trigger, Comparator, Sign Changer, Offset Null, Peak detector, Clipping circuit, Clamping circuits (DC restorer), Waveform Generator.	
9	**Earth Tester / Earth Ground Tester, Ground Resistance, Leakage Current, Current, 0.025 Ohm to 1.5 kOhm, 1 kHz** • Measuring Functions : Ground Resistance, Leakage Current, Current • Resistance Measurement Range : 0.025 Ohm to 1.5 kOhm Resistance Measurement Frequency : 1kHz	01
10	**Megger / Insulation Tester** • Measurement Range: 10 G Ohm • Test Voltage: 50v, 100v, 250v, 500v, 1000 V • Test Current: 1 Ma Nominal • Auto Discharge: Discharge Time0.5 Second for C= 1 F or Less Live Circuit Indicator: Inhibit Test if Terminal Voltage > 30 Volts Prior to Initializations of Test	01
11	**Tong Tester** • Voltage Measure AC Max : 600V • Resistance Measure Max : 40 kohm • Jaw Opening Max : 30mm • Current Measure AC Max : 400A • DMM Functions : AC/DC Current, AC/DC Voltage, • Capacitance, Continuity, Frequency, Resistance, • Temperature • Voltage Measure DC Max : 600V • Range Selection : Auto • No. of Digits : 3.5 DMM Response Type True RMS	01
12	**Tachometer Non-Contact Type** • Non-Contact Tachometer • Can Accurately Measure the Revolutions Per Minute • (Rpm) or Surface Speed and Distance Without Any Contact With the Target It Works on the Principle of Laser Optics	01
13	**Electrical Conductivity Meter** • Conductivity Range: 0.00 to 1.999,19.99,199.9,1999 µs, 19.99, 200.0 ms • Conductivity Accuracy ±1% F.S • Temperature Range 0 to100°C • Temperature Accuracy +1°C • Temperature Coefficient 0 to 3.9% per °C • Calibration Points 1 point per range • Calibration Solution 10 to 17µS, 100 to 170µs, 1000 to 1700µS, 10 to 17 mS • Cell Constant 0.1, 1.0, 10 adjustable • Temperature Compensation 0 to 50°C, Manual or Automatic Power Supply DC 9V, using AC Adapter 220VAC, 50Hz	01

14	**pH Meter -3 Points** • pH Range : 0.00 to 14.00 pH • pH Resolution : + 0.01pH • pH Accuracy : + 0.01pH • mV Range 0 to + 1999 mV • mV Accuracy +1mV • Temperature Range 0 to 100 • Temperature Accuracy +1 • Calibration Points 2 points • pH Buffer Options : NIST (pH 4.00 / 6.86 / 9.18) or USA (pH4.01 / 7.00 / 10.00) • Temperature Compensation : 0 to 100 C, Manual or Automatic Power supply : DC 9V, using AC Adaptor 220 VAC, 50 Hz	01
15	**Displacement / LVDT Transducers Trainer** LVDT Transducer (0 -20mm or -10mm to +10mm) **1.** Resistive linear Transducer(0 -20mm), **2.** Capacitive Linear Transducer(0 -20mm), **3.** Capacitive angular Transducer(0- 90° C) **4.** Inductive Linear Transducer(0 -20mm), • Built in function generator. • O/p waveform- sine, triangle & square, TTL • O/p freq.- 1Hz to 200KHz in ranges with amplitude & freq. control pots, o/p voltage 10Vpp. • Level Measurement (by capacitance transducer using 600mm calibrated acrylic water tank, water pump)	02
16	**Speed sensing Transducer Trainer** • 12V DC motor with speed varying from 0-4000rpm & rotating slotted wheel having 8 slots. Speed transducers: Magnetic pickup, Photo reflective, Photo interruptive, Inductive pickup with envelop detector, Stroboscope, Hall sensor	02
17	**Force / weight Measurement using Piezo Transduser Trainer**	02
18	**Level Measurement Transducer by measuring the water column height using pressure sensor by Air bubler methods Trainer** • Level measurement by capacitance transducer using 600mm calibrated acrylic water tank, water pump, Manual flow valve mounted on compact light weight (190x1000mm) panel. • Level measurement by rotary pot transducer using 600mm calibrated acrylic water tank, water pump, manual flow valve mounted on compact light weight (190x1000mm) panel. • Mounted resistive rotary transducer attachment $0 - 180^0$ Span Humidity measurement demonstrator using polymer hybrid sensor	02
19	**Temperature Sensor Transducers Trainer** • Built in heat bar / mini oven driven by Power amplifier of sufficient wattage • Temp. selection upto 95 degree C in 5 ranges with ON / OFF closed loop control. • Temperature sensors: Thermocouple J with room temperature calibration pot ii) Thermocouple K with room temperature calibration pot, Thermister (100K), PT100, IC sensor (AD 590), Bimetallic switch	02

20	**Piezoelectric Transducers for impact Measurement with attenuator and peak Detector Trainer**	02
21	**Piezo Resistive Transduser for Pressure Measurement Trainer**	02
22	**Pressure Measurement using LVDT Transducers Trainer with built in power supply**	02
23	**Strain Gauge Transducers Trainer** • Piezo resistive transducer for strain measurement Micrometer 0-20mm (Accuracy 0.01mm) for strain generation • Strain gauges in half & full Wheatstone bridge arrangement. • Zero & span adjustment for calibration with instrumentation amplifier. • Experiments on Gauge factor determination, μStrain indicator, Displacement measurement using Strain gauges & cantilever. • Provision to connect external strain gauge based application set ups as follows. a) Piezo resistive transducer for pressure measurement (0-15psi/20psi), Pressure sensor (0-15/20psi), gage type, Pressure generating hand pump connected using T connector to the sensor & Bourden pressure gauge for measurement & calibration b) Piezo electric transducer for impact measurement with attenuator & peak detector. c) Force / Weight measurement using piezo transducer (0-20 kg weighing scale sensor). d) Level measurement by measuring water column height using pressure sensor by bubbler method in 400 mm calibrated acrylic water tank, water pump, vibratory air pressure pump, manual bypass valve mounted on a compact (190mm x 1000mm) panel. e) Torque measurement setup consisting of trunnion mounted 1/4HP single phase 230Vac universal motor, piezo resistive force / torque sensor, loading pulley with 5kg spring balance (2Nos.).	03
24	**Torque Measurement setup**	01
25	**Light Sensing Transducers Trainer** • Incandescent lamp with variable intensity • Light sensors: Photodiode with I to V converter, Phototransistor with I to V converter, Photo resistor/LDR with R to V converter using constant current source, Photovoltaic cell / Solar cell, Opto coupler, Laser diode, Infrared LED, Red LED • Provision to connect external fiber optics application sensor as follows • Elementary Fiber Optics: 3 nos of transmitter diodes (RED (660nm) / BLUE / IR (950nm), 1 no detector (photo transistor),1m PMMA Cable Step Index Type (CRI=1.492, NA=0.5) with SMA Connector I/P's- TTL&AC Coupled (0.4Vp-p), O/P's- AC, DC Coupled & TTL O/P, Band Width : Analog =10Khz, Digital = 50Khz Experiments performed: Setting up ANALOG LINK (Study DC Characteristics &	02

	frequency response of different transmitter diodes), Setting up DIGITAL LINK (observe effect of varying square wave frequency on receiver output). Needs external FG.	
26	**Vibration Sensor Transducer and Air Flow Sensor Trainer** **Vibration sensor** i) Operation Range : Audio frequency (2KHz – 8KHz), ii) Power amplifier : 1W capacity as a vibration generator, iii) Piezo electric sensor iv) Determination of acceleration (accelerometer), velocity, displacement components. • **Air flow sensor** : i) Preheated thermister = 100 ohm, ii) DC fan (12V, 1 ½") to generate variable airflow in a mini wind tunnel with manual outlet control, iii) Bridge amplifier to O/P 0 = 2V at various temperatures (Fan speed).	02
27	**Anderson Bridge Kit** • Anderson Bridge circuit with arms values. • Potentiometer for varying one arm. • Three different value inductances. • Potentiometer with calibrated dial. • Five capacitors selected by a band switch. • One KHz Sine Wave Oscillator with its Speaker. • Adequate no. of patch cords stackable from rear both ends • 4mm spring loaded plug length 1/2 meter. • Good quality, reliable terminal/sockets are provided at appropriate place on panel for connections/ observation of waveforms. • Weight 3.5 (Approx.) • Dimension 279 mm L * 203 mm D * mm H. • Assembled in Metal Box with Screen Printed Circuit on Aluminum Panel with 4mm Socket for test points & to see the waveforms. • Set of Patch Chords & Experimental Manual	02
28	**De Sauty Bridge Kit** • Demonstrates the principle and working of AC bridges for measurement of resistance. • Built in 1 KHz oscillator. • Headphone set for sensitive detection. • Multicolored test points to observe waveforms and voltages. • Housed in an elegant cabinet with a well spread intelligently designed circuit layout on the front panel. • Strongly supported by a comprehensive manual complete with theory and operating details. • Assembled in Metal Box with Screen Printed Circuit on Aluminum Panel with 4mm Socket for test points & to see the waveforms. • Set of Patch Chords & Experimental Manual.	02
29	**Wein Bridge Kit** • Assembled in Metal Box with Screen Printed Circuit on Aluminum Panel with 4mm Socket for test points & to see the waveforms.	02

30	**Wheatstone Bridge Kit** • Dedicated trainer board. • Completely self-contained stand-alone unit. • Demonstrates the principle and working of AC bridges for measurement of resistance. • Supply required 230V, 50 HZ A. C. • Built in IC based DC regulated power supply with short circuit protection and LED indication for supply "ON". • Built in 1 KHz oscillator. • Built in imbalance amplifier • Headphone set for sensitive detection. • Built in variable arms and multiplier. • Multicolored test points at various stages in the circuit to observe waveforms and voltages. • Set of patch cords. • Housed in an elegant cabinet with a well spread intelligently designed circuit layout on the front panel. • Strongly supported by a comprehensive manual complete with theory and operating details. • Assembled in Metal Box with Screen Printed Circuit on Aluminum Panel with 4mm Socket for test points & to see the waveforms. • Set of Patch Chords & Experimental Manual.	02
31	**Maxwell Bridge Kit** The board consists of the following built-parts: • 1 KHz Sine Wave Oscillator. • Audio Amplifier and speaker for null detection. • Five unknown values of capacitors selectable by a band switch. • Three unknown values of inductors selectable by a band switch. • Two-decade resistances in 100-ohm steps. • Potentiometer and adequate no. of other electronic components. • Adequate no. of patch cords stackable from rear both ends • 4mm spring loaded plug length 1/2 meter. • Good Quality, reliable terminal/sockets are Provided at appropriate placers on panel for connections/observation of waveforms. • Weight 3.6 Kg. (Approx.) • Dimension 317 mm L * 229 mm D * 182 mm H. • Assembled in Metal Box with Screen Printed Circuit on Aluminum Panel with 4mm Socket for test points & to see the waveforms. • Set of Patch Chords & Experimental Manual.	02
32	**Hay's Bridge Kit** • Dedicated trainer board. • Completely self-contained stand-alone unit. • Demonstrates the principle and working of AC bridges for measurement of resistance. • Built in 1 KHz oscillator. • Headphone set for sensitive detection. • Multicolored test points at various stages in the circuit to observe waveforms and voltages.	02

	• Set of patch cords. • Housed in an elegant cabinet with a well spread intelligently designed circuit layout on the front panel. • Strongly supported by a comprehensive manual complete with theory and operating details. • Assembled in Metal Box with Screen Printed Circuit on Aluminum Panel with 4mm Socket for test points & to see the waveforms. • Set of Patch Chords & Experimental Manual.	
33	**Schering Bridge Kit** • Dedicated trainer board. • Completely self-contained stand-alone unit. • Demonstrates the principle and working of AC bridges for measurement of capacitance. • Headphone set for sensitive detection. • Multicoloured test points at various stages in the circuit to observe waveforms and voltages. • Housed in an elegant cabinet with a well spread intelligently designed circuit layout on the front panel. • Strongly supported by a comprehensive manual Complete with theory and operating details. • Specifications are subject to change due to constant developments to incorporate the latest technologies. • Assembled in Metal Box with Screen Printed Circuit on Aluminum Panel with 4mm Socket for test points & to see the waveforms. • Set of Patch Chords & Experimental Manual.	02
34	**Kelvin's Bridge Kit** • Dedicated trainer board. • Completely self-contained stand-alone unit. • Demonstrates the principle and working of AC bridges for measurement of capacitance. • Headphone set for sensitive detection. • Multicolored test points at various stages in the circuit to observe waveforms and voltages. • Set of patch cords. • Housed in an elegant cabinet with a well spread intelligently designed circuit layout on the front panel. • Strongly supported by a comprehensive manual complete with theory and operating details. • Specifications are subject to change due to constant developments to incorporate the latest technologies. • Assembled in Metal Box with Screen Printed Circuit on Aluminum Panel with 4mm Socket for test points & to see the waveforms. • Set of Patch Chords & Experimental Manual	02
35	**Owen's Bridge Kit** • Dedicated trainer board. • Completely self-contained standalone unit. • Demonstrates the principle and working of AC bridges for measurement of capacitance.	02

	• Headphone set for sensitive detection. • Multicolored test points at various stages in the circuit to observe waveforms and voltages. • Set of patch cords. • Housed in an elegant cabinet with a well spread intelligently designed circuit layout on the front panel. • Strongly supported by a comprehensive manual complete with theory and operating details. • Specifications are subject to change due to constant developments to incorporate the latest technologies. • Assembled in Metal Box with Screen Printed Circuit on Aluminum Panel with 4mm Socket for test points & to see the waveforms. • Set of Patch Chords & Experimental Manual.	

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