

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

No. F5(962)ST/MNIT/ECE/2021

Phone : 0141-2713312,2713352

NOTICE INVITING QUOTATIONS

Registrar, MNIT, JLN Marg, Jaipur invites sealed tenders for the supply of “**Equipment**” for **Analog Circuit & Signal System lab** for **Electronics and communications 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	10.01.2022
Pre-Bid Meeting Date & Time	19.01.2022 by 2.00 PM
Bid Submission Last Date& Time	31.01.2022 by 2.00 PM
Technical Bid Opening Date & Time	31.01.2022 at 3.00 PM
Financial Bid Opening	Will be intimated later on
Earnest Money	Rs.35,000/- 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 to maximum 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 warranty 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 than 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 extension 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.**35,000/-** from a Commercial bank only in the name of the Registrar, M.N.I.T. and payable at Jaipur may please be sent along with your tender as Earnest Money **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 mention 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)

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)

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 WITNESSETH 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 or absorption 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	:

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:

<u>Sr.No.</u>	<u>Address of Service Centre</u>	<u>Phone No.</u>	<u>Number of Engineers</u>
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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 :

S.No.	Name of fixed Assets/Equipment	Technical Specification	Qty.
EDC and Applied Electronics Lab			
1	Transistor Characteristics Trainer	<ul style="list-style-type: none"> • Inbuilt Fixed DC Power Supply : +5V, -5V, +12V, -12V • Inbuilt Variable DC Supply : $\pm 1V$ to $\pm 15V$ • Inbuilt Transistor : NPN & PNP • Inbuilt Ammeter Range : $1\mu A$ to $200mA$ Display : $3\frac{1}{2}$ digit • Inbuilt Voltmeter Range : $1mV$ to $200V$ Display : $3\frac{1}{2}$ digit • Mains : 230V AC $\pm 20\%$ 50Hz 	05
2	Active Filters Trainer	<ul style="list-style-type: none"> • Inbuilt power supply & Function generator of Frequency range : 1Hz to 100kHz • Variable Cutoff Frequencies. • Adjustable Gain of output. • Design of LPF, HPF, BPF, Band-Reject, Notch Filters for different cutoff frequencies. 	05
3	Hartley and Colpitts Oscillator Trainer	Design of Oscillators using both Transistors and OP-Amp, provided with variable Inductor and Capacitors.	05
4	Wein Bridge Oscillators Trainer	Design of Oscillator using both Transistors and OP-Amp, provided with variable Register and Capacitor.	05
5	Understanding Characteristics of MOSFET, FET and UJT	<ul style="list-style-type: none"> • Inbuilt Fixed DC Power Supply : +5V, -5V, +15V, -15V, +35V, -35V • Inbuilt Variable DC Supply : $\pm 1V$ to $\pm 30V$ • Inbuilt devices : NPN & PNP, p & n-channel MOSFET, JFET, UJT • Inbuilt Ammeter Range : $1\mu A$ to $200mA$ Display : $3\frac{1}{2}$ digit • Inbuilt Voltmeter Range : $1mV$ to $200V$ Display : $3\frac{1}{2}$ digit • Mains : 230V AC $\pm 20\%$ 50Hz 	05
6	Two Port Networks Trainer	Inbuilt Fixed DC Power Supply : +5V, -5V, +12V, -12V Inbuilt Variable DC Supply : $\pm 1V$ to $\pm 15V$ Inbuilt devices : Resistor, Capacitor, Transistor-NPN & PNP	05
7	FET Amplifier Trainer	FET in self-bias circuit with inbuilt bias power supply and variable i/p (both voltage and frequency)	05
8	Power and Differential Amplifier Trainer	Different biasing circuit with inbuilt bias power supply and variable i/p (both voltage and frequency)	05

9	BJT Amplifiers and Emitter Follower Trainer	Inbuilt Fixed DC Power Supply (Regulated) : +5V, -5V, +12V, -12V Inbuilt Function Generator of Sin, Triangular, Square of range 1Hz -100KHz, 5 Vpp	05
10	Operational Amplifier Lab Trainer	Inbuilt Fixed DC Power Supply (Regulated) : +5V, -5V, +12V, -12V Inbuilt Variable DC Supply (Regulated) : ±1V to ±15V Inbuilt Function Generator of Sin, Triangular, Square of range 1Hz to 100KHz Devices : 1. SMD Multipal Resistance bank of 1/2W 2. Multipal Electrolyte Capacitor Bank 3. OP-Amp (IC uA741/other - 10nos.) 4. Diode (1N 4007/other - 5nos.) 5. Transistor (NPN & PNP) 6. Bread Board	05
11	3 1/3 Digital Multimeter	DCV, DCI, ACV, ACI, 2-wire resistance, frequency, continuity, diode test, dB, capacitance, temperature, frequency counter, 4-20 mA % scale	05
12	4 1/2 Digital Multimeter	DCV, DCI, ACV, ACI, 2-wire resistance, frequency, continuity, diode test, dB, capacitance, temperature, frequency counter, 4-20 mA % scale	05
13	5 1/2 Digit Bench top Digital Multimeter	DCV, ACV, DCI, ACI, 2- and 4-wire resistance, frequency, period, continuity, diode, temperature, capacitance	02
Digital Communication Lab			
1	PAM, PPM, PWM and Line Coding Techniques	PAM, PWM, PPM, Line Coding Techniques of Sine, Square, Triangle, Arbitrary signals for multiple Sampling frequencies.	05
2	PCM, DPCM, CVSD Modulator and Demodulator	PCM, DPCM, CVSD Techniques of Sine, Square, Triangle, Arbitrary signals for multiple Sampling frequencies.	05
3	Delta, Adaptive Delta, Sigma Delta Modulator & Demodulator	Delta, Adaptive Delta, Sigma Delta Modulator Techniques of Sine, Square, Triangle, Arbitrary signals for multiple Sampling frequencies.	05
4	4-Channel TDM-PCM Transmitter and Receiver	Two & Four channel TDM-PCM Modulator Techniques of Sine, Square, Triangle, Arbitrary signals for multiple Sampling frequencies.	05
5	Digital Companding A-Law and μ-Law	Compression & Decompression using A-Law and μ-Law techniques for Sin wave.	05
6	Understanding Noise Generator and its applications	Noise generation techniques using : White Noise, Additive White Gaussian Noise, Pseudo Random Noise of Sine, Square, Triangle, Arbitrary signals for multiple frequencies.	05
7	ASK, FSK, BPSK, DBPSK Modulator & Demodulator	ASK , FSK , BPSK , DBPSK Modulator & Demodulator Techniques of Sine, Square, Triangle, Arbitrary signals for multiple Sampling frequencies.	05

8	QPSK, OQPSK, DQPSK Modulator & Demodulator	QPSK, OQPSK, DQPSK Modulator & Demodulator Techniques of Sine, Square, Triangle, Arbitrary signals for multiple Sampling frequencies and 8-Bit , 16-Bit , 32-Bit , 64-Bit data pattern.	05
9	Understanding MSK, GMSK, FSK, GFSK Modulator and Demodulator with AWGN Channel Noise and BER	<ul style="list-style-type: none"> • Modulations techniques: Continuous Phase FSK (CPFSK), Minimum Shift Keying (MSK), Gaussian Frequency Shift Keying (GFSK), Gaussian Minimum Shift Keying (GMSK) • USB Matlab interface utility (Software programmable) 	05
10	OFDM Modulator and Demodulator Training System	OFDM technique with QPSK modulation & Demodulation	05
11	Understanding Block Code Encoder & Decoder	Block code of 4, 8, 16-bit in NRZ format.	05
12	Convolutional Encoder & Decoder Trainer	Word length of 4, 8, 16-bit in NRZ format.	05
13	16 QAM (Quadrature Amplitude Modulation) Trainer	On board Data generator with Step Variable data length (8, 16, 32, 64 bits) using different encoding Technique (eg. Gray to Binary Encoder) for 16-QAM modulation technique.	05
14	Digital Communication Training System	Vector pattern of 4, 8-bit data using : ASK, FSK, BPSK, DBPSK, QPSK, DQPSK, $\pi/4$ QPSK, OQPSK, M-ary ASK, M-ary FSK, MSK, 8-PSK, 8-QAM, 16-PSK, 16-QAM at multiple carrier frequencies.	05
15	Sampling & Reconstruction	Use of different sampling Techniques (Natural, Flat-top etc.) for Sine, Square, Triangle, Arbitrary signals for multiple Sampling frequencies.	05

Deputy Registrar
(Store & Purchase)