GOVERNMENT COLLEGE OF ENGINEERING
Jamunalia, Old Town, Keonjhar-758 002

No. 1158 Dated: 04-07-2026

TENDER CALL NOTICE

Sealed tenders are invited form reputed original manufacturers/ authorized distributors up to the date mentioned in the tenders for supply of equipment through speed post for **Department of Electrical Engineering**. The date of opening the tender is mentioned in the respective tender document, which will be opened in the office of the Principal, Government College of Engineering, Keonjhar in the presence of bidders and/or their nominees. The tender bid documents with details of terms and conditions are to be downloaded from the College Website: **www.gcekjr.ac.in**

The authority reserves the right to reject/cancel the tenders in whole or in part without assigning any reason thereof. The authority will not be responsible for any postal delay.

Sd/-
Principal

4/7/2026

04/VII/2026

Bid Ref No. 1158 Date: 04-07-2026

BIDDING DOCUMENTS AND INSTRUCTION TO SUPPLY EQUIPMENTS FOR DEPARTMENT OF ELECTRICAL ENGINEERING

GOVERNMENT COLLEGE OF ENGINEERING, KEONJHAR

Jamunalia,Old Town,Keonjhar– 758002

04/VII/2026

04/7/2026

INVITATION FOR BIDS

Principal, Government College of Engineering, Keonjhar invites sealed bids from eligible bidders for supply of machineries/equipment to Department of Electrical Engineering.

Interested eligible Bidders may obtain detail information and list of items with technical specifications from **the website of the College** **www.gcekjr.ac.in**

Particulars about submission of bidding document are as follows:

(a) Price of bidding document: **Rs.2000/-(Service Tax is included)** (non-refundable)

(b) First date of availability of Bidding Document in the website: 04-07-2026

(c) Last date and time for submission of bids: 28-07-2026

(d) Time and date of opening of bids: 30-07-2026

(e) Place of opening of bids: **Principal Office, Government College of Engineering Jamunalia, Old Town, Keonjhar-758002**

(f) Address for communication: **Principal Government College of Engineering Jamunalia, Old Town, Keonjhar -758002**

Sd/
Principal

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1. Eligibility of Tenderer and General Instructions:

1.1 Eligibility:

Those who fulfill the following criteria are eligible to participate in the tender.

a) The tenderer must be a reputed Original Manufacturer or the Authorized agent/ dealer of a reputed manufacturer.

b) If the tenderer is an Authorized Dealer/Agent of a reputed manufacturer, necessary certificate to this effect from his manufacturer must be enclosed

c) The tenderer registered with Sale Tax Department will be preferable.

d) Turn-over of the tenderer should be more than **Rs. 1 crore** in last three financial years (2022-23, 2023-24 & 2024-25) and certificate must be verified by CA.

e) The bidder should submit audited balance sheet of last three financial years (2022-23, 2023-24 & 2024-25) which is preferable.

f) The tenderer must provide Sales Tax/GST Clearance (GSTR 3B) Certificate.

g) The tenderer must submit ITR for last three financial years (2022-23, 2023-24 & 2024-25).

h) GST and PAN Number must be enclosed along with the Tender documents.

i) The tenderer must submit the willingness for providing comprehensive maintenance/service support of the Machine/equipment supplied by him for at least two years after expiry of the warranty period in their letter head.

j) The tenderer must provide evidence of purchase order from reputed organizations like NITs/IITs/IIESTs/IISERs/NISER/IISc/Central Research Laboratories/ Reputed Government/Private universities and colleges.

k) The manufacturer should be preferably ISO: 9001-2008.

l) The manufacturer should have preferably its own NABL (National Accreditation Board for Testing and Calibration Laboratories) accredited laboratory or equipment supplied should have certification from any NABL accredited laboratory in respect of quality and performance.

m) The manufacturer should be preferably registered with ESI.

n) The manufacturer should have preferably its own R&D section registered with Government of India.

1.2 General Instructions:

The selection for procurement of equipment will be based on quality and performance along with cost. In this context decision of technical committee is final based on documentary evidence or actual physical verification.

a) Submission of more than one bid by a particular tenderer under different names is strictly prohibited. In case it is discovered later on that, this condition is violated, all the tenders submitted by such tenderer/s would be rejected or contract cancelled.

b) The tenderer should mention in the tender paper, the location of its service center nearest to Keonjhar.

c) All offers should be in English and the price quoted for each item should be firm.

d) Warranty period, Delivery period and After-Sale-Service conditions, etc. are also to be clearly indicated.

e) The rates and the conditions of the offer will remain valid for three months from the date of opening of the tender and no change or alteration of the rate will be acceptable on any account.

f) Submitted tender forms with overwriting or erased or illegible specifications and rates will be rejected.

g) Request from tenderer in respect of additions, alterations, modifications, corrections, etc. of either terms & conditions or rate after opening of the bid may not be considered. However, negotiation may be made before finalization.
h) Tenderers shall carefully examine the bid documents and fully inform themselves of all the conditions, which may in any way affect the work of the cost thereof.
i) Should a tenderer find discrepancies or omissions from the specification or other documents and any doubt as to their meaning, he should at once notify the purchaser and obtain clarification in writing.
j) This, however, does not entitle the tenderer to ask for time beyond the due date fixed for receipt of tenders.
k) The tenderer must also specify minimum time and maximum time to repair/replace in the event of a failure and penalty thereof.
l) Verbal clarification and/or information given by the purchaser or its employees or representatives shall not be binding on the purchaser.
m) Submission of sealed bid will carry with the implication that the tenderer agrees to abide by the conditions laid down in the detailed particulars of the bid notice.
n) Conditional offers and offers qualified by vague and indefinite expression, as 'subject to immediate acceptance' 'subject to prior sale', etc. will not be considered.
o) While tenders are under consideration, tenderers and their representatives or other interested parties are advised to refrain from contacting by any means, to the purchaser's personnel or representatives on matter relating to the tenders under study.
p) The purchaser, if necessary, will obtain clarification on tenders by requesting such information from any or all the tenderers either in writing or through personal contact as may be necessary.
q) The tenderer will not be permitted to change the substance of his offer after the tenders have been opened.
r) In the event of non-compliance with this provision, the tenderer is liable to be disqualified.

1.3 Procedure for Submission of Tenders:

The Tenderers must submit their bids as required in two parts in separate sealed covers prominently super scribed as Part-I "Technical Bid" and Part-II "Financial Bid" and also indicating on each of the covers the "Tender call Notice Number & Date" and due date and time of submission as mentioned in Tender Call Notice.

Part-I (Technical Bid)

Excepting the price schedule, all other documents as mentioned in para 1.1 i.e details of technical specifications, printed information Catalogue for each instrument, Copy of Firm Registration Certificate from the competent authorities, Sale Tax clearance, Income Tax Clearance, PAN Card copy, GST, list of clients, evidence of successful execution with photograph, etc. along with tender document duly signed by the authorized person in each page shall be covered in Part-I (Technical Bid).

Part-II (Financial Bid)

All indications of price shall be given in Part-II (Financial Bid).

a) Both sealed covers **Part-I "Technical Bid"** and **Part-II "Financial Bid"** should be placed in a third cover along with requisite **EMD & cost of Tender documents** (separately in the form of DD drawn in

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favour of **Principal, Government College of Engineering, Keonjhar** at any Nationalized Bank payable at Keonjhar) , others requisite supporting documents etc. and sealed. The sealed cover containing tender documents as per procedure indicated above should be sent to the Office of the Principal, GCE, Keonjhar by Registered Post/Speed Post addressing to the Principal, Government College of Engineering, Jamunalia, Old Town, Keonjhar-758002, **within the due date and time as stipulated in Tender. The sealed envelope must show the name of the tenderer and his address and should be super scribed as "*Tender for supply of Equipment for Electrical Engineering Department*" on the top of the envelope**.

b) All the documents submitted must be in the papers showing signature of the tenderer and printed office name of the tenderer on official seal.

c) All the documents must be submitted in a sequential manner with separator/flags to help in quick scanning of the topics. Wherever possible, data in tabular form should be given.

2. Requirements by Tenderer before Supply:

2.1 Rating Plate, Name Plate and Labels:

Each of the equipment is to have permanently attached to it, a rating plate of non-corrosive material in a conspicuous position, upon which the total specifications along with the manufacturer's name, address, etc. are to be engraved.

2.2 Packaging:

All the equipment are to be suitably protected, covered in water -proof packing and crated to prevent damage or deterioration during transit and storage till the time of installation. The supplier shall be responsible for any loss or damage caused during transportation, handling or storage till their successful installation.

2.3. Inspection:

a) All materials / equipment shall be inspected and tested for completeness, proper assembly, operation, cleanliness and state of physical condition and performance as per quoted specification.

b) The test shall be conducted, reported and certifications to be provided by the tenderer.

c) The tenderer shall provide all test and measuring equipment/tools required for inspection / testing.

d) The cost of all such tests shall be borne by the Tenderer.

e) GCE reserves the right to reject any equipment if it does not comply with the specifications during site testing, installation and commissioning stage.

f) Inspection & testing would be conducted, jointly, at various stages as applicable during unpacking, installation and commissioning of respective equipment / components at the manufacturing site.

2.4. Environmental Condition:

All the equipment supplied shall be rugged and should operate without any deviation in quality, or degradation of equipment performance. All the specification/parameters shall be guaranteed over the following environmental conditions:

* Storage Temperature : 0 to 50^0 C
* Operating Temperature : 0 to 50^0 C
* Humidity : 95% RH (non-condensing)

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All the equipment are intended to operate under 220 V/ 440V, 50 Hz power supply.

3. Requirements by Tender after Supply:

3.1 Supply:

a) The material would be delivered by the supplier at GCE, Jamunalia, Old Town, Keonjhar – 758002, Odisha.

b) The items should be supplied directly from the manufacturing terminal having passed all tests successfully with Certifications as required.

c) The equipment should conform to the latest relevant National/International standards and shall be completed in all respect.

d) Any component, fitting etc. which may not have been specifically mentioned in the specifications but which are usual and necessary for the equipment, shall be supplied by the tenderer at no extra cost.

e) In case, articles are found damaged in transit or found short at the time of delivery the full cost of the same will be deducted from the bill of the supplier in case the supplier does not replace the stock within a week from the date of the complaint.

f) The articles ordered must be supplied in one lot within 4 (four) weeks of placing of the order.

g) In case of delay in delivery or successful installation, a penalty of 1% (one per cent) per week shall be levied.

h) GCE reserves the right to procure the materials from alternative sources at the risk and cost of the successful tenderer giving 15 days' notice.

i) Any increase in tax and duties after expiry of delivery period will be borne by the supplier.

j) In case the items supplied by the supplier are found not up to the specification shall be rejected.

k) The supplier will be intimated to take back the stocks at his own cost within three days from the date of rejection and to replace the same within 7 days, failing which the EMD will be invoked in addition to taking legal actions.

l) Imported consignment, if any, should be destined to GCE, Jamunalia, Old Town, Keonjhar – 758002, Odisha, India through Bhubaneswar Air Port.

m) The suppliers shall be responsible for releasing the consignments from the carriers/transporters.

n) The equipment shall be delivered and installed at site at the cost of the tenderer.

o) All taxes, levies, surcharges including the customs clearance and handling freight and insurance should be paid and handled by the tenderer.

3.2 Installation and Commissioning:

Installation and Commissioning shall include the following:

a) Installation and Testing of the Equipment, Machineries etc. must be conducted by the tenderer at GCE.

b) It will be the responsibility of the tenderer to provide all necessary spares and consumables, which may be required during installation and commissioning, at no extra cost to purchaser.

c) The tenderer is to bring their own testing and measuring instruments required for installation, testing, commissioning, which can be taken back after completion.

d) Installation must complete within 15 days after delivery on site.

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e) During installation and commissioning the complete intended experiments is to be conducted with results must be within accepted level of accuracy.
f) The raw materials and samples required for conducting experiments during installation is to be supplied by the tenderer free of cost.

3.3 Documentation:

a) Detailed technical manuals, handbooks, drawings, Warranty card and Factory Quality Assurance checklist, test results and any other certifications mentioned in the technical specifications shall be supplied along with the consignment.
b) Supplied manuals/handbooks must cover detailed technical specifications and installation, operation, maintenance and System Safety procedures.
c) For Experimental setups details of theory, procedure and methods of taking measurements etc. should be provided in the form of hand books for each experiment.
d) The receipts for GST paid, if any, for the supplied materials should also be submitted.

3.4 Trial Operation and Performance Guarantee Test:

a) After successful completion of Installation and Commissioning of the equipment, a 7-day continuous trial operation putting those on optimum use shall be conducted by the tenderer at site, during which the performance of the equipment shall be demonstrated for trouble-free continuous operation, meeting the specified standards and proper training shall be imparted to two persons of the purchaser.
b) During trial operation, tenderer shall do all necessary adjustments required to ensure the performance as per the acceptable level.
c) In case, guaranteed performance is not established, the tenderer shall be given opportunity to rectify/replace the equipment/components, and restart the 7 days continuous trial operation, at the risk and cost of the tenderer.

3.5 On-Site Warranty:

a) The entire materials may be used continuously. The reliability and safety of the total installed system and trouble-free operation are, therefore, of prime importance. The supplied devices/equipment and components shall be covered under **Two-years or more** comprehensive on-site warranty from the date of issue of successful completion of Performance Guarantee Report.
b) During the period of warranty, it shall be the responsibility of the tenderer to provide all essential spares and consumables, which may be required for maintenance and trouble-free operation of the devices / components at the tenderer's cost.
c) Software, if any, has to be tested with at least one-year warranty for trouble free operation.

3.6 Comprehensive Maintenance Contract:

a) The tenderer shall be under the obligation of entering into a Comprehensive Maintenance Contract (CMC) with GCE for a minimum period of two years, renewable if felt necessary, on mutually acceptable rates, terms and conditions. CMC shall start after the completion of Warranty.
b) The scope of CMC shall cover maintenance and supply/replacement of materials and components, for smooth and reliable operation of the systems without trouble.
c) Accordingly, the tenderer has to offer rates for the CMC structure per equipment along with the price for the Systems and other associated Equipment supplied.

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3.7 After Sales Service:

a) During the warranty period and subsequently, after signing of Agreement for CMC the tenderer shall attend to the problems reported by the users of GCE on a priority basis.

b) For any problem reported the tenderer shall attend and rectify the problem within 7 (seven) days or provide a standby system of the similar configuration.
c) The report on any problem will be informed through phone or fax number of which shall be given by the tenderer.
d) The branch office of the concerned manufacturing firm will be fully responsible to provide maintenance service, in case of any negligence, in providing the service by the tenderer.
e) On failure to comply with those instructions, the Bank Guarantee provided for the warranty period shall be invoked.

4. Financial Terms:

4.1 EMD

a) The tenderer has to submit a Demand Draft / Banker's Cheque / Pay order of Rs. 50,000/ - **in favour of Principal, Government College of Engineering, Keonjhar** payable at Keonjhar in any Nationalized Bank towards EMD.

b) There will be no interest paid to the tenderer towards EMD money.

c) In no case, the EMD Money in cash or other forms will be accepted at the time of opening of the bid.

d) No request for adjustment of claims, if any, will be accepted.

e) The EMD of unsuccessful tenderers will be refunded as soon as possible after the tenders are finalized.

4.2 Performance Security Deposit

In case of successful Bidder EMD will be kept as Performance Security Deposit and will be refunded after expiry of stipulated warranty periods from the completion date of installation and commissioning on satisfactory performance of the equipment.

4.3 PRICES:

Price quoted should be for Government College of Engineering, Keonjhar only. Tax components as applicable should be mentioned clearly in the financial bid.

a) Price should be quoted for unit item.

b) Purchase order will be placed as a single lot for each type of item or for all the items together, as the case may be.

c) In case of items of import, the tenderer should take full responsibility for customs clearance, handling, tax payment, etc. and specify the charge for the same in the price bid.

4.4 Sales Tax Concession:

Central Sales Tax Concession is to be availed on production of the required certificates applicable to Educational Institution.

4.5 Discount:

a) Our Institute is a pioneer Institution in the field of Teaching and Research in Engineering and allied disciplines and do not run with profit motive.

b) As such we are availing price discount for purchase of equipment/instruments.

c) The rate of discount or any other Institutional benefit arising out of Govt. Policy etc., on each item may also be indicated in the bid specifically.

4.6 Payments:

a) In case of imported items, payment will be made by opening LC in the name of the manufacturer subject to the condition that a Bank Guaranty for an equal amount will be submitted by the selected tenderer to GCE for the period of completion of installation and commissioning.

b) In case of purchase in Indian Rupees, payment of 90 percent of the ordered value will be made after successful installation and commissioning of the equipment subject to submission of satisfactory performance report by the concerned Head of Department. The rest 10 percent of the payment will be made after one year of successful installation of the equipment.

4.7 Penalty:

If the delivery, installation and commissioning is not carried out in time as specified in other part of the tender document, the tenderer/manufacturer will be charged @ 1 % (one per cent) per week of the total value of the concerned machine / equipment.

4.8 Rate Contract with DGS&D or any other Government Organisation:

In case the tenderer has entered into a Rate Contract with DGS & D or any other Government Organization such as EPM, rate contract preference, number & copy of rate contract have to be submitted along with tender.

5. Instruction to the Tenderer:

a) Some of the minimum specifications specified may be redundant, obsolete or incompatible and in these cases, quote the particulars of correct specification of latest trend and technology.

b) Higher specifications instead of minimum specifications are allowed if a minimum specification is not available, obsolete or incompatible.

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c) Otherwise, model with higher specification should be in addition to the model with minimum specifications.
d) Specify brand name and full model name and number for each offer.
e) Include the printed catalogue and pricelist if any for each of the equipment quoted.
f) Specify the list of Accessories required along with each of the equipment.
g) Quote the additional price of the accessories; only those, which are fully compatible with the quoted model, should be furnished.
h) Specify the list of Accessories to be given free of cost, along with the equipment as **"Free Accessories"**; these should be fully compatible with the quoted models.

5.1 Solving Disputes:

a) GCE, the tenderer and the manufacturer shall make all efforts to resolve amicably by direct informal negotiation on any disagreement or dispute arising between them under or in connection with this contract.
b) All disputes arising out of the contract shall be referred to courts under the jurisdiction of the Keonjhar court only.
c) The above terms and conditions except those otherwise agreed upon, shall form a part of the Purchase Order.
d) Sign on each page of this tender document and Return it along with the offer enclosing this part together with the Technical Offer.
e) The GCE authority has all rights to accept / reject any tender without assigning any reasons thereof.

6. Technical Specifications:

Following are the minimum specifications of the equipment.
a) The minimum specifications are indicative and not exhaustive.
b) The models with higher specifications may be quoted.
c) The quoted materials should be of latest trend and technology.
d) Each equipment should be complete in itself without needing any extra requirements except the requirement of general test and measuring instruments.
e) All the respective lab. Equipment must have warranty period of minimum two years.

1. Basic Electronics Lab

Sl. No.	Name of the Experiment	Specification	Qt.
01	Input Output characteristics of NPN and PNP transistor.	Includes NPN (CL100) & PNP (CK100) on-board panels for CE/CB configurations. Built-in IC Regulated DC Supply (0-15V, 0-30V, Fixed +12V/+5V), Function Generator (0-100KHz), 2mm Brass Pins, and 48 kS/s 14-bit Multifunction USB Data Acquisition (DAQ) Module path.	02nos.
02	Study of characteristics of JFET	JFET BF256 on-board experiment panel with dedicated voltage regulators for Vds (0-10V) and Vgs (0 to ±10V), built-in analog/digital milliammeter, and integrated 48 kS/s 14-bit Multifunction USB DAQ infrastructure interface.	2nos
03	Transfer characteristics and drain characteristics of MOSFET	Mosfet (IRF540) on-board diagnostic panel, integrated power supplies, metering interfaces, and 48 kS/s 14-bit Multifunction USB Module (supplied without DSO connection path).	01 No.
04	OP-AMP: Inverting and Non-Inverting Configuration. Record of Waveforms.	Equipped with 3x LM741, 1x LM324 operational amplifiers, premium ZIF Socket, surface-mounted SMD Resistors/Capacitors arrays, Function Generator (0-100KHz), and a standalone 25MHz Ultra-thin Virtual Oscilloscope (VDS1022) with 100MS/s real-time sample rate.	01 No.
05	Half Wave and Full Wave Rectifier without Capacitor filter. Record of Waveforms, Measurement of Average and RMS value.	Half/Full Wave Rectifier analytical study unit featuring premium on-board 1N4007 diodes, modular high-clarity schematic layout panel, bundled with an extra VDS1022 25MHz Digital Storage Oscilloscope and interface accessories.	01 No.
06	Universal GATE testing	Features on-board 10-NAND (7400) and 10-NOR (7402) multi-logic gates, 16x2 characters LCD screen display for on-board voltage/current/frequency metrics, 16-bit logic inputs/outputs, and an integrated variable frequency generator (1Hz-100kHz).	2nos

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2. Basic Electrical Engineering Lab.

Sl. No.	Name of the Experiment	Description	Qt.	Specification
01	Portable Watt Meter		01	Range: 2.5/5A, 150/300/600V (LPF type, P.F.=0.2) , **Make: AE**
02	Portable Watt Meter		01	Range: 2.5/5A, 150/300/600V (UPF type, P.F.=1), **Make: AE**
03	Rheostats		02	500Ω,2Amp (Single Tube)
04	Rheostats		02	260Ω,1.4Amp (Single Tube)
05	Rheostats		02	100Ω,5Amp (Single Tube)
06	Rheostats		02	750Ω,1.2Amp (Single Tube)
07	Demonstration of cut sections of Machine	DC Machine-Commutator-Brush arrangement Induction Machine (Squirrel Cage Rotor) Synchronous Machine (field winding-Slip ring arrangement) Single Phase Induction Machine	01 01 01 01	DC Shunt Machine, 2HP, 8A, 220V DC, 1500 RPM, SPDP, foot Mounted type. 2HP, 3phase, 1440rpm, 415 V, 50 HZ, SPDP, foot Mounted type (6 –Terminals type) Synchronous Machine, 2HP, 3phase, 1500rpm, 415 V, 50 HZ, SPDP, foot Mounted type. 1-phase Capacitor Start Capacitor Run Machine (CSCR), 1 HP, 5A, 230 V, single phase foot mounted type.

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3. Electrical Machine Lab

Sl no.		Specification	Quantity
1	Voltmeter	0-600 V MI Type, Make: AE	5
	Voltmeter	0-600 V MC Type, Make: AE	5
	Voltmeter	0-300 V MI Type, Make: AE	3
	Voltmeter	0-300 V MC Type, Make: AE	3
	Ammeter	0-2 A MI Type, Make: AE	3
	Ammeter	0-5 A MI Type, Make: AE	3
	Ammeter	0-5-10 A MI Type, Make: AE	3
	Ammeter	0-15 A MI Type, Make: AE	3
	Ammeter	0-2 A MC Type, Make: AE	3
	Ammeter	0-5 A MC Type, Make: AE	3
	Ammeter	0-5-10 A MC Type, Make: AE	3
	Ammeter	0-15 A MC Type, Make: AE	3
	Rheostat	45 Ω, 5 A	2
	Rheostat	1200 Ω, 0.8 A	2
	Rheostat	400 Ω, 1.7 A	2
	Rheostat	200 Ω, 1.5 A	2
	Rheostat	100 Ω, 5 A	2
	Rheostat	200 Ω, 5 A	2
	3-Phase Wattmeter Dynamometer Type	500 V, 10 A, UPF, Make: AE	2
	3-Phase Wattmeter Dynamometer Type	500 V, 5 A, UPF, Make: AE	2
	1 Phase PF Meter	300 V, 5 A, Make: AE	2
	3 Phase PF Meter	500 V, 10 A, Make: AE	2
	3 Phase PF Meter	500 V, 5 A, Make: AE	2
	Auto Transformer	3 Phase 440 V, 15 A, Make: AE	2
	Auto Transformer	1 Phase 220 V, 10 A, Make: AE	2
	3 Phase Resistive Load	5 KW	1
	1 Phase Inductive Load	3 KVA,5A Fine	1
	3 Phase Inductive Load	5 KVA, 5A fine	1
	3-Phase Wattmeter Induction Type	500 V, 10 A, UPF, Make: AE	2

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	3-Phase Wattmeter Induction Type	500 V, 5 A, LPF, Make: AE	2
	3-Phase Wattmeter Induction Type	500 V, 5 A, UPF, Make: AE	2
	Multimeter	Digital (Fluke/Mecco)	15
2.	Load characteristics of DC series motor	DC Series Motor,3HP,12A,220V DC,1500 RPM, SPDP, foot Mounted type, Frame Size- 132 2-Point Starter for the above Motor, Pony Brake Arrangements for the above consisting of Brake Drum, Belt and Dial type spring Balances etc. Control Panel for performing experiment on DC Shunt Motor consisting of 2 pole MCB, special Nylon based terminals, indication lamp assembled and wired in on a hylem sheet and fitted to MS angle frame Portable DC voltmeter (0-300V) Portable DC ammeter (0-10-20A)	01 01 01 01 01

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4. Electrical Circuit Analysis Lab.

Sl. No.	Name of The Experiments/Kit	Specification	Quantity
1	Frequency responses of band pass and band elimination filters.	Experimental Trainer Board that contains: - Built in Power Supply, DC Regulated power Supply: +5V DC & +12V DC.AC Supply: 12-0-12VAC.Short circuit Protected. Built in Function Generator, O/p Waveform: Sine, Triangle & TTL O/Ps. Output Frequency: 1 Hz to 1MHz, with amplitude & frequency control pots. Onboard potentiometers: 1K - 1No. 1M - 1No. Adjustable resistors (1 kΩ – 100 kΩ), capacitors (10 nF – 100 μF), and inductors (10 μH – 100 mH). Standard Accessories: Power Chord, Patch Chords & Instruction Manual. The experimental kit must be robust and simple in connection.	1pc
2	Determination of two port network parameters (hybrid and transmission parameters).	Experimental Trainer Board that contains: - Built in Power Supply. DC Regulated power Supply: +5V DC & +12V DC.Onboard potentiometers: 1K - 1No. 1M - 1No.Adjustable resistors (1 kΩ – 100 kΩ), capacitors (10 nF – 100 μF), and inductors (10 μH – 100 mH). Standard Accessories: Power Chord, Patch Chords & Instruction Manual, Multimeter. The experimental kit must be robust and simple in connection.	1pc
3	Study of series and parallel connected magnetically coupled circuits. Experiments Supported by the Trainer Kit:(i)Study of Mutual Inductance, (ii)Series Connected Magnetically Coupled Circuits (iii)Parallel Connected Magnetically Coupled Circuits (iv)Transformer Coupling: (v)Phase Relationship in Magnetically Coupled Circuits:	Experimental Trainer Board that contains: - Transformer: Primary: 0-220V-230V, Secondary: 12-0-12VAC. Short circuit Protected. Coil with taps (Tap 1, Tap 2 &Com). Electromagnetic Relay: DC %V, DPDT 1A-100V AC. Standard Accessories. Power Chord, Patch Chords & Instruction Manual, Multimeter. The experimental kit must be robust and simple in connection.	1pc
04	Verification of AC Network Theorems (Superposition, Thevenin, Norton, Reciprocity and Maximum Power Transfer Theorem)	Experimental Trainer Board that contains: Built-in regulated DC and AC power supply. Function generator (1 Hz–100 kHz). Switchable network configuration for theorem verification. Precision resistors, capacitors and inductors mounted onboard. Test points for voltage/current measurements. Provision for CRO/DSO connection. Standard accessories: Patch cords, power cord and manual. The kit shall support both single-phase AC and DC network analysis.	2 pc

5. Analog & Digital Electronics Lab.

Sl. No.	Name of the Experiment	Quantity	Specification
01	Design and simulate voltage divider biasing circuits using BJT-CE configuration and compare the results. Objectives i. Measurement of DC currents and voltages across test nodes. ii. Characterization of parameter variations using an onboard potentiometer. iii. Complete AC performance analysis, including plotting and studying voltage gain metrics using CRO/DSO interfaces. iv. Experimental calculation and validation of input impedance and output impedance values. v. Direct diagnostics of nodal resistances, DC voltages, and loop currents via high-precision multimeter test-points.	01 no	Built in Power Supply - Integrated DC Regulated Power Supply Unit providing +5V DC and +12V DC lines. - Onboard short-circuit protected AC Supply terminal providing 12-0-12 VAC lines. - Built-in Dedicated Function Generator providing stable Sine, Square, Triangle, and TTL outputs across a continuous frequency band of 1 Hz to 1 MHz, complete with granular amplitude and frequency fine-tuning potentiometers. - Precise onboard configuration potentiometers: 1K (1 No.) and 1M (1 No.).
02	Design and simulate of voltage divider biasing circuits using JFFET-CS configuration. Objectives i. Measurement and tracking of DC bias currents and terminal voltages. ii. Adjustment of active operating parameters through physical onboard potentiometer control tuning. iii. Execution of AC small-signal amplification mapping, assessing small signal voltage gain parameters with CRO/DSO setups. iv. Mathematical calculation and verification of stage input/output impedances. v. Component-level diagnostic verification of voltages and path currents using external multi-testers.	01 no.	Integrated Power Infrastructure: Regulated dual DC output sources matching +5V DC and +12V DC. - Protected isolated secondary AC Supply providing 12-0-12 VAC lines. - Embedded Function Generator Module delivering high-fidelity Sine, Square, Triangle, and digital TTL signals (Range: 1 Hz to 1 MHz) featuring independent amplitude attenuation and variable sweep pots. - Onboard component adjustments: 1K (1 No.) and 1M (1 No.) variable control loops. - Front panel diagnostic
03	Design and simulate of self-biasing circuits of MOSFET. Objectives i. Precision assessment of target DC biasing currents and gate-to-source/drain-to-source voltages. ii. Systematic manipulation of self-bias resistance configurations via embedded pot units. iii. Comprehensive AC characterization, tracking target terminal gain limits on digital storage oscilloscopes. iv. Strategic extraction of dynamic input impedance boundaries and load-side output impedance. v. Direct cross-comparison of multi-point nodal parameters via standard external testing tools.	1no.	Built in Power Supply - Built-in IC-Regulated DC Power Source supplying stable +5V DC and +12V DC lines. - Short-circuit resilient AC auxiliary tap matching 12-0-12 VAC parameters. - Master Function Generator block yielding premium Sine, Square, Triangle, and TTL lines with a dynamic range of 1 Hz to 1 MHz, supporting custom amplitude and frequency adjustment knobs. - Integrated precision control potentiometers: 1K (1 No.) and 1M (1 No.). - Robust hardware packaging with clearly labeled schematic glyphs and symbols on a highly Instruction Manual
04.	Determine the frequency response of BJT CE amplifier:	1no.	Detailed mapping and evaluation of the Maximum Gain parameters expressed in

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	low frequency, Mid-frequency and high frequency response. Objectives Detailed mapping and evaluation of the Maximum Gain parameters expressed in decibels (dB). ii. Quantitative extraction of the 3 dB Lower cut-off and Upper cut-off frequencies measured in Hz. iii. Accurate determination and analytical calculation of the total 3 dB Bandwidth envelope of the amplifier stage. iv. Phase and voltage verification via real-time plotting of input and output waveforms over CRO/DSO equipment.		decibels (dB). ii. Quantitative extraction of the 3 dB Lower cut-off and Upper cut-off frequencies measured in Hz. iii. Accurate determination and analytical calculation of the total 3 dB Bandwidth envelope of the amplifier stage. iv. Phase and voltage verification via real-time plotting of input and output waveforms over CRO/DSO equipment.
05.	Determine the frequency response of BJT emitter follower (CC amplifier) circuit. Objectives . Verification and evaluation of unity-gain profiles and maximum operational gain (dB) boundaries. ii. Boundary tracking for lower and upper 3 dB frequency points across changing source scales. iii. Operational profiling of total system working bandwidth (Hz). iv. Continuous visual tracking of input-to-output tracking phases via terminal CRO/DSO instruments.	1no.	High-grade laboratory trainer featuring built-in stabilized power supplies providing +5V DC and +12V DC channels. - AC Power line tracking: 12-0-12 VAC, with short-circuit suppression layout. - Onboard Function Generator tracking 1 Hz to 1 MHz frequencies for Sine, Square, Triangle, and TTL wave shapes with variable output level dials. - Standard accessory inventory: Power patch leads, robust terminal connector wires, and structured lab experiments manual
06.	Determine the frequency response of JFET CS amplifier circuit. Objectives i. Quantitative assessment of the maximum stage voltage gain profile in dB. ii. Tracking and evaluation of the 3 dB lower and upper corner roll-off frequencies. iii. Direct assessment of the total effective amplifier bandwidth parameters. iv. Oscilloscope-guided signal validation across various input signal steps	1no.	Rigid hardware module including built-in stabilized DC Power Unit (+5V DC and +12V DC rails). - Isolated AC step-down terminal: 12-0-12 VAC line with short protection logic. - Multi-signal tracking Function Generator producing standard testing waves (Sine, Square, Triangle, TTL) up to 1 MHz with fine adjustments. - Bundled peripherals: Certified heavy-duty electrical cord, reliable terminal jumper pins, and guided lab manual document.
07.	Determine the frequency response of MOSFET CS- amplifier circuit. Objectives i. Absolute gain extraction and frequency roll-off graphing metrics in dB. ii. Discovery and logging of the critical -3dB upper and lower bandwidth limits. iii. Analytical estimation of the operational system bandwidth parameters. iv. Waveform comparison modeling using external digital storage scopes	1no.	- Specialized testing bench with integrated IC-stabilized power delivery delivering +5V DC and +12V DC parameters. - Built-in standard short-proof AC transformer line giving 12-0-12 VAC. - Integrated sweep-capable signal synthesizer/function generator covering 1 Hz to 1 MHz bands with independent tuning dials for amplitude control. - Standard delivery configuration: Power connector cable, safe connection links, and fully mapped experiment handbook. Instruction Manual
08.	Universal Bread Board The following experiment are need to be done by using universal bread board., 1. Design of Binary Multiplier.	10nos.	Detailed technical specification: Experimental Trainer Board that contains: -Tie points on bread, board: 2000 nos. or more (solder less), High quality breadboard, Inbuilt fixed

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	2. Design and implementation of code converters gray to binary and BCD to seven segmentdisplay. 3. Design and implementation of a function using Multiplexer (MUX) and Demultiplexer (DEMUX). 4. Design of function using decoder and encoders. 5. Flip-Flop: assemble, test and investigate operations of S-R, D and J-K flip-flops. 6. Shift Registers: Design and investigate the operation of all types of shift registers with Parallel load. 7. Counters: design, assemble and test various ripple and synchronous counters - decimal counter, binary counter with parallel load.		power, supply, Inbuilt variable power supply. Inbuilt function Generator. O/P, Waveform: Sine, Triangle, Square and TTL O/Ps, O/P Frequency: 1Hz to 10 MHz, Onboard transformer. Onboard Timer (clock Generator) 1Hz – 10MHz, Onboard Logic Probes. Type: Four state (High, Low, Pulse, High-z) 16- Bit Data switches. Onboard Pulse Generator. Solder less Breadboard can be used for testing 14/16 pin digital IC`s of 54 & 74 series. Onboard Manual clock Both positive & negative edge triggered clock pulse Generator & sequence circuits. 16-bit LED display. Logic probes. Standard Accessories Power Chord, Patch Chords & Instruction Manual The experimental kit must be robust and simple in connection.

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6. Electrical Measurement & Instrumentation Lab.

Sl. No.	Name of the Equipment	Qt.	Specification
01	i. Wheatstone Bridge Experiments: Measurement of unknown resistance	01 no.	Features: • Range of Measurement : 5Ω - 100KΩ • Accuracy (Min to Max.): ±0.2 ±5Ω • Tolerance : ±5% • Built-in power supply • Resistance Box- To vary resistance in steps of 100Ω
	ii. Maxwell Inductance Bridge Experiments: Measurement of unknown inductance	01 no.	Features: • Audio amplifier with speaker to detect the bridge balancing conditions (optional) • Measurement Range :10mH - 200mH • Tolerance : ±5% • Built-in power supply • Inductance Box (Min - 100μH to Max – 100mH)
	iii. De-sauty's Bridge Experiments: Measurement of unknown capacitance	01 no.	Features: • Measurement Range: 0.02μF to 0.9μF • Sensitivity : ±0.03μF • Audio amplifier with miniature speaker to detect the balance condition of the bridge (Optional) • Capacitance Box : Range 100pf to 11.11μfd in steps
	iv. Kelvin's Double Bridge Experiments: Measurement of unknown resistance	01 no.	Features: • Range of Measurement :0.1Ω-0.82Ω • Tolerance : ±5% • Built-in power supply
	v. Schering Bridge Experiments: Measurement of unknown capacitance	01 no.	Features: • Measurement Range : 0.01μF to 2μF • Sensitivity : ±0.1μF • Tolerance : ±5% • Audio amplifier with miniature speaker to detect the balance condition of the bridge (Optional)
	vi. Hay's Bridge Experiments: Measurement of unknown inductance	01 no.	Features: • Audio amplifier with speaker to detect the bridge balancing conditions (optional) • Measurement Range: 5mH - 500mH • Sensitivity : ±5mH • Built-in power supply

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	vii. Anderson Bridge Experiments: Measurement of unknown inductance	01 no.	Features: • Audio amplifier with speaker to detect the bridge balancing conditions (optional) • Measurement Range : 25mH - 500mH • Sensitivity : ±2mH • Built-in power supply
02	LVDT characteristics trainer Objective: Measurement of linear displacement using LVDT	01 no.	Features: • LVDT sensor with Micrometer (Range: 0-25mm) • Signal Conditioner for LVDT • Displacement calibrated Range for +10mm • Output voltage: 0-5V • Built in Power Supply • digital indicator to display the Displacement
03	J-type thermocouple characteristics trainer Objective: Study of temperature voltage characteristics of J type thermocouple	01 no.	Features: • `J' type Thermocouple as a temperature sensor • sensor for cold junction compensation • Signal conditioner f or `J' type thermocouple output: 0-5V • Built in Instrumentation power supply • digital indicator to display the temperature. • Water bath as heat source • Thermometer provided to monitor the temperature
04	Strain gauge characteristics trainer Objective: To measure strain developed in a cantilever beam using strain gauge Experiments: Strain - Voltage characteristics	01 no.	Features: • Cantilever beam of maximum weight up to 1Kg • A pan with slotted weights to vary the strain • Built in power supply • Digital display for displaying the strain • Offset and gain variable provision

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7. Power Electronics Lab.

SL. NO.	Name of the Item	Specification	Qty.
1	To measure the latching and holding current of a SCR	SCR characteristics study unit: -	1
		V–I characteristics study trainer and to find out holding and latching current of SCR. One potentiometer to vary VGK from 1.5V to 15V @100mA. One potentiometer to vary VAK from 3.5V to 35V @500mA. Consists of 2 SCRs with heatsink, RatingofSCR's-12A/600V&16A/1200V, one no. 25Watts Variable load Resistance. This unit is enclosed in a powder coated Ms box with Screen Printed Front panel PVC striker.	
2	Rheostat	Rheostat:100Ω,5A(Single Tube)	1
3	Inductor	Loading Inductor 1(Ø) –150mH/5A	1
		3-Phase step type Loading Inductor,415V, 50Hz, 0-2-4-6-8-10A AC (Step Variable)	1
4	Tachometer	Digital Contact type	3
5	Multimeter	Digital type	4
6.	Study of single phase full wave controlled and semi converter rectifier circuits with R & RL load:	Single phase converter Firing circuit: Single phase converter firing unit using Ramp – Comparator method : ➢ This unit generate four synchronized and isolated triggering pulses to fire thyristors connected in single phase half wave, full wave, half controlled bridge, fully controlled bridge and AC phase control power circuit. ➢ The firing circuit should be based on ZCD, Ramp generator, Opamp comparator and amplifier/pulse transformer isolation method. ➢ The unit should work directly on 230V AC mains. Firing angle variation from 180^0 to 0^0 on a graduated scale. ➢ This unit is enclosed in a powder coated MS box with Screen printed front panel PVC striker. b)Single phase Fully controlled Power Circuit:230V/5A ▪ Four SCR's (25TTS12) rated for 1200V/16A with heatsink, snubber and fuse. ▪ ONE free wheeling diode. ▪ Two digital meters to measure o/put Voltage and Current. ▪ This unit is enclosed in a powder coated MS box with Screen printed front panel PVC striker. Accessories:- a) R-load:- 230V/5A-150 Ohms/5A. b) L-Load :- 0-150 mH/5A with tapings.	1

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		c) 0-230V/5A Single phase isolation Transformer with tapings. ➢ 10:1 CRO Probe	
7	Study of Single Phase PWM Voltage Source Inverter.	Firing circuit is based on microcontroller generating 4 gate pulses for single phase. Single phase operation can be selected using the switch provided. Operating frequency is 25 Hz to 50 Hz using the potentiometer. PWM can be varied by a potentiometer provided. IGBT based Voltage Source Inverter circuit consists of 4 IGBTs. 4 IGBTs are selected for single phase VSI action. Power devices are mounted on proper heat sink protected by fuse & snubber circuits. Devices used are 30A/1200V. This unit is enclosed in a powder coated MS box with Screen printed front panel PVC striker.	1
8	Isolation Transformer	Isolation Transformer 1(Ø) 1 KVA,5A, 0-230V / 0-30-60-115-200-230V	2
		Isolation Transformer 3(Ø) 2 KVA,5A, 0-230-415V / 15-150-230V	1

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8. Control System Engineering Lab

1	To DC Servomotor driven Position Control Unit: Objective: Study the working and principle of DC Servo Motor Servo potentiometer for position sensing servo potentiometer as an error detector and Both open loop and closed loop system can be analysis using position control Also study the position control using tacho generator feedback (if possible)	System should contain: ➢ Positive/Negative tacho generator feedback ➢ Position Control of 12 V -20V, 1A-2A dc geared PM motor 50/60 RPM ➢ Built in step signal and 2 numbers of 360^0 servo potentiometers ➢ Calibrated dials with 10 resolutions for reference and output position. ➢ In built tacho generator and Calibrated forward path gain 3 to 10 in steps and also Calibrated tacho constant 0.2 to 1 in steps ➢ The motor unit is housed in a separate cabinet with transparent Cover for easy viewing. Interconnection with the main unit is through a standard 9-pin D-type connector. All power supplies and step input signal are internally provided. DC Servo Motor having both side shaft. One end coupled with Techo generator & other end coupled loading arrangement with potentiometer ➢ In addition, a 3½ digit LED display is available on the panel for the measurement of various signals. A good quality measuring CRO is the only accessory that would be required. ➢ Built in waveform capture / display card for study dynamics in step mode ➢ IC regulated dc power supplies for circuitry and Power requirement: 220 VAC +10%, 50Hz	01
2	Transfer function of DC Motor *Objective:* Armature controlled DC servomotor. Field controlled DC servomotor In addition,the determination of torque-speed characteristics, inertia and friction parameters and back e.m.f of a dc servomotor Transfer function is calculated from the above data	System should contain: ➢ DC motor -0.5HP/220V, 1500 RPM ➢ DC motor Controller. ➢ A DC motor is provided with speed measurement and accurate measurement of time ➢ DC source 50V-220V/3-5A with overload protection for armature ➢ DC source 50V-220V/2-3A with overload protection for field ➢ One no. of isolated variable AC source 50V-220V/2-3A for inductance measurement. ➢ Digital contact Tachometer. ➢ 0-220V @ 3-4 Amps variable DC supply for Armature of DC motor for speed control of DC motor using single phase half controlled bridge rectifier. ➢ A variable DC supply from 100V – 220V @ 2-3Amps for field of DC motor for speed control of DC motor by field control and also for field of DC generator for variable DC generator output.	01

		➢ A fixed supply of 220V ± 10% for field of DC motor ➢ A variable AC supply of 0-230volts + @ 2-3 Amps to find inductance of armature and field of DC motor / Generator. ➢ A digital voltmeter to measure AC and DC voltages with AC/DC selector switch. ➢ A digital Ammeter to measure AC/DC current with AC/DC selector switch. ➢ Fuse Protection is provided for the power supplies. ➢ 6A / 1 pole MCB is provided to switch ON/OFF the AC supply to the unit and also for protection. ➢ One digital stop clock provided for time measurement.	
3	Study of Compensation Network *Objective:* To study lead , lag , limited lead , limited lag and lead - lag compensating network To study active and passive filters setups	System should contain: ➢ This unit consists of the following items: Sine wave generator – 25Hz – 1KHz. ➢ Microcontroller based LCD display to display the frequency/phase angle meter with lead/lag indication. ➢ A digital voltmeter is provided to measure the V_{peak} of Network input & Network output to calculate gain. ➢ Different values of resistors & capacitors supplied along with this unit to connect in Lead – Lag Network Inbuilt fixed output • DC Regulated power Supply : + 12VDC & 5VDC • Digital Phase angle meter : 0-360 degree • Digital AC Voltmeter : 0.1V to 5V or 12V • Compensation network using • Operational Amplifier : Lead, lag, limited lead, limited lag and lead-Lag • Inbuilt all pass Network • Power requirement : 220 VAC +10%, 50Hz Standard Accessories: Power Chord, Patch Chords & Instruction Manual, Three pin female metal connector cable	01

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9. Power System Lab

Sl. No.	Name of the Item	Specifications	Quantity
01	Over /Under Voltage and Relay Trainer Kit (Numerical)	Supply, installation, and demonstration of Over/Under Voltage Relay Trainer Kit, numerical/electromechanical type, suitable for 230 V, 50 Hz AC supply, provided with variable AC voltage source, over-voltage and under-voltage relay, digital voltmeter, digital timer, trip circuit, indication lamps, MCB/fuse protection, safety terminals, patch cords, experiment manual, and calibration certificate. The relay should have adjustable voltage and time settings with clear indication of pickup, dropout, and trip operation. Accessories DC motor 2 HP /215 v DC 1500 rpm coupled with AC three Phase 1 KVA /415 volt / 50 Hz / 4 pole Alternator in a flexible MS channel All the terminals of the relay contact, alarm, timer power supply etc. brought out on a front Bakelite sheet of the panel for flexible connection. With MCB's with Fuse (Both neutral and phase), indicators, switches, connecting patch cords, operating manuals etc. Complete setup housed on Almirah type M.S. box cabinet suitable for wooden table mounting with provision for lock and key arrangement.	01
02	To study the MHO and reactance type distance relays.	Supply, installation, and demonstration of Mho and Reactance Type Distance Relay Trainer Kit suitable for study of transmission line distance protection. The kit shall include Mho and reactance relay characteristics, simulated R-L transmission line, adjustable fault location, fault resistance facility, voltage and current measurement, trip circuit, digital timer, fault indication, relay pickup/trip indication, safety terminals, patch cords, experiment manual, and calibration certificate. The kit shall be suitable for demonstrating R-X characteristics, zone-wise distance protection, and the effect of fault resistance on relay operation. Objective: To determine zone-1, zone 2 and zone 3 fault detection.	01
03	Over /Under Frequency Relay Trainer Kit (Numerical)	Supply, installation, and demonstration of Over/Under Voltage Relay Trainer Kit, numerical/electromechanical type, suitable for 230 V, 50 Hz AC supply, provided with variable AC voltage source, over-voltage and under-voltage relay, digital voltmeter, digital timer, trip circuit, indication lamps, MCB/fuse protection, safety terminals, patch cords, experiment manual, and calibration certificate. The relay should have adjustable voltage and time settings with clear indication of pickup, dropout, and trip operation. Accessories DC motor 2 HP /215 v DC 1500 rpm coupled with AC three Phase 1 KVA /415 volt / 50 Hz / 4 pole Alternator in a flexible MS channel All the terminals of the relay contact, alarm, timer power supply etc. brought out on a front Bakelite sheet of the panel for flexible connection. With MCB's with Fuse (Both neutral and phase), indicators, switches, connecting patch cords, operating manuals etc. Complete setup housed on Almirah type M.S. box cabinet suitable for wooden table mounting with provision for lock and key arrangement.	01

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1. Digital Signal Processing Lab.

SL. NO.	Name of the Item	Specification	Qty.
1	DSP KIT	1. Floating-Point DSP Kit (e.g., TMS320C6748) • Processor: 32-bit Floating-Point Core (up to 456 MHz). • Memory: 256KB L2 Cache, 128MB–256MB DDR2 RAM. • Audio/Video: Line-In, Line-Out, Mic ports; VGA/LCD interface. • I/O & Interface: Ethernet, RS232 Serial, USB 2.0, user LEDs/switches. • Best For: High-performance filtering, speech/image processing, and complex algorithms. 2. Fixed-Point DSP Kit (e.g., TMS320C5535) • Processor: 16-bit Fixed-Point Core (Ultra-Low Power). • Memory: On-board Serial Flash, MicroSD card slot. • Audio/Display: Low-power stereo audio codec, small OLED screen. • Best For: Portable electronics, basic audio/FFT processing, and low-power applications. 3. Software & Debugging (Common to Both) • IDE: Texas Instruments Code Composer Studio (CCS). • Debugging: Built-in XDS100v2 JTAG emulator for real-time debugging via USB.	10

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2. Microprocessor and Microcontroller Lab.

Sl. No.	Name of the Item	Specifications	Quantity
01	Programs for Digital clock and Stop watch (Using 8086).	Hardware: 8086 Microprocessor Trainer Kit, Digital Clock/Stopwatch Interface Board	01
02	Interfacing ADC and DAC with 8086.	Hardware: 8086 Microprocessor Kit, ADC Interfacing Module, DAC Interfacing Module, Connecting Wires, CRO/Multimeter	01
03	Parallel Communication between two Micro Processor Kits using Mode 1 and Mode 2 of 8255.	Hardware: 8086 Microprocessor Trainer Kits, 8255 PPI Interface Board, Flat Ribbon Cable	01
04	Interfacing and Programming 8279, 8259, and 8253 with 8086.	Hardware: 8086 Microprocessor Kit, 8279 Keyboard/Display Interface, 8259 PIC Board, 8253 PIT Board, Connecting Leads	01
05	Serial Communication between two Micro Processor Kits using 8251.	Hardware: 8086 Microprocessor Trainer Kits, 8251 USART Interface Board, Serial RS232 Cable	01
06	Programming and verifying Timer, Interrupts and UART operations in 8051.	Hardware: 8051 Microcontroller Trainer Kit, USB Cable, Serial Communication Cable	01
07	A design problem using 8051 (Multi-parameter data acquisition, elevator/traffic simulation, LED matrix clock, etc).	Hardware: 8051 Development Board, Elevator/Traffic Light Simulation Board, LED Matrix Module, Sensors, Connecting Jumpers	01
08	To measure the distance of the obstacle using ultrasonic sensor and Arduino and display on LCD.	Hardware: Arduino Uno/Nano Board, HC-SR04 Ultrasonic Sensor, 16x2 I2C LCD, Breadboard, Jumper Wires Software: Arduino IDE	01
09	To read sensors (temp, humidity, motion) with Arduino and send data to server (Raspberry Pi) over wireless interfaces.	Hardware: Arduino Uno Board, Raspberry Pi (Server), DHT11, PIR Sensor, Wi-Fi (ESP8266) or Bluetooth (HC-05), Wires Software: Arduino IDE, Python, MySQL/InfluxDB	01
10	To design/simulate a security system using RFID module and alert via SMS (GSM) with geo-coordinates (GPS).	Hardware: Arduino/Microcontroller Board, RC522 RFID Module with Tags, SIM800L GSM Module, Neo-6M GPS Module, Power Supply, Jumpers Software: Arduino IDE or Proteus	01