

कार्यालय, प्राचार्य, शासकीय पॉलीटेक्निक, तखतपुर जिला-बिलासपुर (छ.ग.) पिन कोड - 495330  
e-mail Address:- govtpolytakhapur@gmail.com  
Website:- www.govtpolytechnictakhapur.ac.in

## :: द्वितीय निविदा सूचना ::

क्रमांक/शापॉत/स्टोर/अपग्रेडेशन/2021/550/ तखतपुर, दिनांक 22.11.2021

कार्यालय, प्राचार्य शासकीय पॉलीटेक्निक, तखतपुर जिला-बिलासपुर (छ.ग.) की ओर से निर्माताओं (Manufacturers) तथा उनके अधिकृत वितरक (Distributor), विक्रेताओं (Dealer) से निम्नानुसार तालिका में दशाये गये विभागों के विभिन्न प्रयोगशाला उपकरण प्रदाय करने हेतु प्रत्येक विभाग के लिये पृथक-पृथक लिफाफों में पृथक-पृथक धरोहर राशि सहित सील बंद निविदायें आमंत्रित की जाती है -

क्रं.	विभाग का नाम	अनुमानित क्रय राशि (लाख रुपये में)	धरोहर राशि रुपये में
1	मेकेनिकल इंजीनियरिंग	18.21	54630=00
2	इलेक्ट्रानिक्स एण्ड टेली कम्युनिकेशन इंजीनियरिंग (कम्प्यूटर हार्डवेयर एवं साफ्टवेयर सामग्री)	17.92	53760=00

निविदा प्रपत्र कार्यालय, प्राचार्य शासकीय पॉलीटेक्निक, तखतपुर जिला-बिलासपुर (छ.ग.) से आवेदन प्रस्तुत कर प्राप्त किया जा सकता है। निविदा प्रपत्र का मूल्य रुपये 500=00 है।

निविदा प्रपत्र वेबसाईट [www.govtpolytechnictakhapur.ac.in](http://www.govtpolytechnictakhapur.ac.in), <http://cgdteraipur.cgstate.gov.in>, & [www.bilaspur.gov.in](http://www.bilaspur.gov.in) से भी प्राप्त किया जा सकता है, किन्तु निविदा प्रपत्र हेतु निर्धारित शुल्क रुपये 500=00 का बैंक ड्राफ्ट जो प्राचार्य शासकीय पॉलीटेक्निक, तखतपुर के नाम देय हो, निविदा प्रपत्र के सुरक्षा निधि लिफाफे में रखें, अन्यथा यह माना जावेगा कि निविदा प्रपत्र विधिवत रुपये से क्रय नहीं किया गया है।

निविदा के संबंध में तिथियाँ निम्नानुसार है :-

निविदा बिक्री की अंतिम तिथि - 27.12.2021 - 05:00 बजे अपरान्ह  
निविदा जमा करने की तिथि - 28.12.2021 - 03:00 बजे अपरान्ह  
निविदा खोलने की तिथि - 28.12.2021 - 04:00 बजे अपरान्ह

स्थान :- कार्यालय प्राचार्य, शासकीय पॉलीटेक्निक, तखतपुर जिला-बिलासपुर (छ.ग.)।

*M 22/11/2021*  
**PRINCIPAL**  
शासकीय पॉलीटेक्निक, तखतपुर  
TAKHATPUR जिला-बिलासपुर (छ.ग.)

**OFFICE OF THE PRINCIPAL**  
**GOVERNMENT POLYTECHNIC, TAKHATPUR DISITT – BILASPUR (C.G.) Pin Code-459330**  
e-mail Address:- [govtpolytakhhatpur@gmail.com](mailto:govtpolytakhhatpur@gmail.com)  
Website:- [www.govtpolytechnictakhhatpur.ac.in](http://www.govtpolytechnictakhhatpur.ac.in)

TENDER - DOCUMENT  
FOR  
PURCHASE OF EQUIPMENTS  
(2021 - 2022)

निविदा सूचना क्रमांक/शापोत/स्टोर/अपग्रेडेशन/2021/550/तखतपुर, दिनांक 22.11.2021

- |                              |  |
|------------------------------|--|
| 1. Value of work             | Approx Rs 3668932 (Rs. Thirty Six Lacs<br>Sixty Eight Thousand Nine Hundared<br>Thirty Two only) |
| 2. Tender document issued to | M/s-----<br>-----  |
| 3. Cost of Tender            | Rs 500-00 (Rs Five Hundred only)   |
| 4. Money receipt & Date      | -----  |
| 5. Date of issue of tender   | -----  |

Issued by

*M* 22/11/2021

I/s Principal

Government Polytechnic, Takhatpur  
GOVT. POLYTECHNIC  
DISITT, Bilaspur, C.G.  
TAKHATPUR DISTT. BILASPUR

**OFFICE OF THE PRINCIPAL**  
**GOVERNMENT POLYTECHNIC, TAKHATPUR DISITT – BILASPUR (C.G.) 459330**  
 e mail Address:- [govtpolytakhatur@gmail.com](mailto:govtpolytakhatur@gmail.com)  
 Website:- [www.govtpolytechnictakhatur.ac.in](http://www.govtpolytechnictakhatur.ac.in)

No./Tech/GPT/Store/Upgradation/2021/ 550 /Takhatur, Dated 22.11.2021

Sealed Tenders are invited from the intended manufacturer/authorized dealer/distributor for supply of Goods/ Equipments/ Machine to Government Polytechnic Takhatpur Disitt. – Bilaspur (C.G.). Details are as follows. Suppliers are required to submit separate tender for each part.

1.	Last Date and time for Issue of Tender	27.12.2021 (5:00 PM)
2.	Last Date and time for Receiving Sealed Tender	28.12.2021 (3:00 PM)
3.	Date and time of opening the tender	28.12.2021 (4:00 PM)
4.	Tender fee	Rs. 500
5A	EMD for Mechanical Engg.	Rs. 54630=00
5B	EMD for Electronics and Telecommunication Engg. (Computer Hardware and Software Item)	Rs. 53760=00

**TERMS AND CONDITIONS**

Terms and conditions for supply of Machines/ Equipments are as per following list:

1. For participation in tender process following signed and stamped documents must be furnished in envelope A – super scribed as “Technical Bid envelope A”.
  - a. Income Tax returns of the last three years and Commercial Tax clearance certificate as well as PAN/TAN/TIN/GST registration No. with documental proof.
  - b. Registration of firm/company.
  - c. Sales tax/GST clearing certificate.
  - d. GST certificate from commercial tax department for the related business. GST Registration certificate must be valid and live. In GST Registration certificate the items of tender must be clearly mentioned.
  - e. ISO/BIS certificate for firm/product.
  - f. Manufacturer/ authorized dealer/distributor certificate.
  - g. Balance sheet /Turnover of firm/company of last three years duly signed by CA.
  - h. Item specifications/Literature /Brochure / leaflet regarding quoted items.
  - i. Acceptance of terms and condition ( signed and stamped copy of tender document).
  - j. Any other document which you consider as necessary.
  - k. The bid shall be accompanied by Proforma for Technical bid in Annexure-I (**Please provide hard copy as well as soft copy (CD) of Technical bid in MS. Words/M.S. Excel Format in the envelope.**)
  - l. The bid shall be accompanied by Proforma for DECLARATION FOR NOT BLACK LISTED in Annexure-III.
  - m. The bid shall be accompanied by affidavit in prescribed format as given in Annexure-IV on non judicial stamp paper or Rs 50 certified by Notary.
2. Envelope B should contain Financial bid in Proforma as given in Annexure-II along with taxes and discount if any and super scribed as “Financial Bid envelope B”. (**Please provide hard copy as well as soft copy (CD) of Financial bid in MS Words/MS Excel Format in the envelope.**)

3. Envelope C should contain followings and Envelope C should be super scribed as **"Tender fee and EMD envelope C"**.
  - (a) Demand Draft for Tender fee (if tender downloaded from website) or purchase receipt of Tender (if Tender is purchased from office of the Government Polytechnic, Takhatpur).
  - (b) Demand Draft for EMD or Enclose the certificate of relaxation/exemption for submitting the EMD.
4. Envelopes A, B & C should be put in a third big envelope and Super scribed as "Tender for supply and installation of machine/equipment" All envelope should be signed and should be sealed on all joints.
5. Sealed envelope for the tender should be super scribed as tender Notice **No....., dated .....** should be addressed to Principal, Government Polytechnic, Takhatpur Gram- Lidri Disitt – Bilaspur (CG) Pin No. 495330 Tender for .....be clearly mentioned on the envelope (at Left- hands side Top Corner).
6. Envelope C of Tender fee and EMD will be opened first if it is found worth consideration then the Envelope-A of Technical bid and documents will be only opened and if it is found worth consideration after that the Financial bid Envelope –B will be opened.
7. The tender is liable to be rejected if not submitted as per the prescribed conditions and in the prescribed format in envelope A, envelope B and envelope C as given in point 1, 2 & 3 .No further clarification will be entertained.
8. The suppliers should quote their offer/ rate in clear terms without any ambiguity. Discount if any must be clearly specified.
9. If the same supplier is submitting tender for more than one part then duplicate documents /certificates are not required. Only one set of documents is sufficient.
10. The tender will be opened on the date and time given above in the presence of tenderer(s) or their representative who desire to be present.
11. Tender received after due date and time will not be entertained.
12. Tender form is non transferable.
13. The tender document is also available on the website [www.govtpolytechnictakhatpur.ac.in](http://www.govtpolytechnictakhatpur.ac.in), <http://cgdteraipur.cgstate.gov.in>, & [www.bilaspur.gov.in](http://www.bilaspur.gov.in) tenderer can downloads the document from the website, in that case he has to deposit DD of Rs 500=00 in favor of **Principal, Government Polytechnic, Takhatpur Distt – Bilaspur (C.G.)** payable at **Takhatpur Disitt – Bilaspur (C.G.)** at the time of submission of tender. Otherwise his tender will not be entertained.
14. A soft copy of the tender in CD should be submitted along with the tender document.
15. Item no. and page no of the tender form should be strictly in chronological order. Make/model, name of the manufacturer with complete address should be mentioned against each item and equipment.
16. The tender should be sent in firms own letter pad along with terms and conditions. Printed condition on the back of the tender will not be binding unless separately mentioned.

17. The tenderer must furnish complete and detailed technical specification supported by printed literature/catalogue/leaflet of the equipment offered. Item no. and page no. of the equipment should be mentioned in it. Incomplete specifications/ absence of printed literature support may result in to the rejection of the tender.
18. The rate should be FOR destination (**Govt. Polytechnic, Takhatpur, Village – Lidari P.O. - Jaroandha, Distt - Bilaspur (C.G.) Pin Code - 459330**) including all taxes, packing forwarding, transportation etc. Warranty/Guarantee installation if any on any item it should also be stated clearly.
19. Taxes, (whichever is applicable state clearly item wise) if leviable extra, should be clearly indicated, failing which the rate quoted in the tender will be considered as inclusive of all taxes.
20. There should be no alterations / corrections made in the Tender. The quoted rate should be in figures and words both. The tenderer may quote the rate of any or all the items listed in the tender form. Rates should be quoted separately for individual item and not in lump-sum for all taken together.
21. The tender should clearly indicate whether the equipment is complete in itself. If in the opinion of the tenderer, certain accessories are necessary with the type of the equipment tendered, the tenderer must quote for aforesaid accessories under the heading "extra but essential".
22. The tenderer are required to deposit EMD separately for each head The EMD should be deposited in the form of Demand Draft drawn in favor of **Principal, Government Polytechnic, Takhatpur** payable at **Takhatpur Disitt – Bilaspur (C.G.)** against tender – -----Takhatpur Disitt – Bilaspur, dated -----. Tenders received without EMD will be rejected. Requests for relaxing EMD will not be entertained. EMD by cheque or MO will not be accepted.
23. In case of non- acceptance of the tender the EMD will be refunded to the tenderer in due course of time without interest. The EMD will be treated as security deposit in case of selected tenders EMD/ security deposit will be forfeited in case of breach of agreement of supply by the tenderer/supplier. The order shall stand cancelled and security deposit forfeited if. EMD of successful bidder will be returned after the submission of PBG.
  - (I) Supplier expresses his inability to execute the order for the quoted items within validity period of the tender at the rate quoted in the tender and for makes/ brand quoted in the tender.
  - (II) The complete equipment is not supplied within the delivery period mentioned in the order or within the extended period permitted.
  - (III) The supplier executes only a part of the order.
24. Any Equipment/ Trainers/ Hardware or software breakdown must be attended within 48 hours during the valid warranty period of the equipment/ software, free of cost.
25. Payment shall be released after the successful installation and demonstration/testing of the machine equipment at the institution.
26. The training for at least two persons for handling the machine/equipments shall be testing provided by the supplier at his own cost.
27. The tenderer has to give demonstration/testing of the machine/ equipments software at **Government Polytechnic- Takhatpur Disitt – Bilaspur (C.G.)** wherever necessary at his own cost.

28. The one time extension in the delivery period may be granted at the discretion of the undersigned. The penalty at a rate of 2% per month of the full cost of the equipment is liable to be charged for the extension of the delivery period.
29. Equipment received after the delivery period or dispatched after the delivery period mentioned in the order will also be subjected to this penalty.
30. In case of any default in execution of the order, the undersigned reserves the right to forfeit the EMD/Security deposit. The undersigned also reserves the right to cancel the order and forfeit the EMD/Security deposit in case the tenderer fails to adhere strictly to all terms and condition of the order/ tender.
31. If defects of any kind or deviations from the specification are detected and reported to the supplier, the supplier should make replacement or rectify the defects free of cost within 10 days from the date of report, failing which the equipment will not be accepted and will be taken back by the supplier at his own cost and risk, and the EMD will be forfeited. In case the equipment is sent for repairs to the firm, it should be repaired within 10 days. From the date of receipt of equipment failing which the same will not be accepted and EMD will be forfeited, However the undersigned may condone the delay in deserving cases at his/her discretion.
32. The undersigned reserves the right to increase/ decrease the quantity of the equipment to be supplied. If equipment supplied are not according to the ordered specifications and are not of proper quality, the same will not be accepted. Similarly second hand, reconditioned, damaged, repaired and substandard equipments and equipment having poor workmanship would not be accepted. Only brand new equipment calibrated in SI unit and with fine workmanship will be accepted.
33. The submission of the tender will be deemed to be the acceptance of all the terms and condition of the tender as stated herein and/ or elsewhere in the tender document.
34. Tenders should be valid up to next 31th March. The prices should be firm without variations of any kind.
35. The undersigned reserves the right to accept the lowest or any tender and also of rejecting whole (all) or any part of tender without assigning any reasons for the same or to split up the tender as he/she may deem fit.
36. Exact and earliest possible time of delivery should be indicated in the tender against each item. The delivery period given in the order will be the date of receipt of the equipment in the institute and not the date of dispatch of the equipment by the supplier.
37. No advance payment will be made. The successful tenderer will have to execute in the form as approved by Government of Chhattisgarh.
38. If tenderer has supplied these items to any PSU/ Government/reputed Private firm/deptt. Then submit last three years PSU/ Government/ Private Supply record as far as possible.
39. The minimum guarantee/warranty period for the equipment supplied by the supplier should be mentioned clearly and should not be less than one year from the date of installation. The tenderer will be required to undertake repair/ replacement of defective parts free of cost at the institution during the guarantee period.
40. All the disputes with regard to the contract of purchase of equipment etc. is subjected to **Bilaspur Chhattisgarh** Jurisdiction only.

41. In the event of the order, supplier who is the manufacturer of the equipment will be required to furnish a certificate to the effect that they are manufacturers of such and such make whereas the authorized dealer/distributor will have to furnish certificate issued by the manufacturer certifying that tenderer is their authorized dealer/distributor of that product/item. Without this certificate tender will not be accepted.
42. The tenderer shall guarantee that after sales services will be provided as and when required. Replacement or repair of part should be done and delivered free of cost at this institution within guarantee/warranty period.
43. The supplier will render necessary assistances, if required, in the installation of the equipment/ machinery in the institute/ site free of charge.
44. No. offer should be made for imported item for which import license has to be arranged by the undersigned. The entire imported item will have to be delivered in the institute and payment will be made in rupees.
45. The payments shall be released only after satisfactory and successful commissioning and installation of the equipment/ machinery at the designated site/ institute and on submission of bill by the firm.
46. The rate quoted should preferably be net, inclusive of all taxes and duties, packing forwarding, freight, insurance and other incidental charges. In case these charges quoted extra in addition to the quoted rates, the amount there of or advalorem rate must be specified.
47. In the event of any dispute arising out of the tender or from the resultant contract, the decision of the Principal, **Government Polytechnic, Takhatpur Disitt – Bilaspur (C.G.)** will be final.
48. The Tender document/ resultants contract will be interpreted under Indian laws.
49. If the successful tenderer, on receipt of the order fails to execute the order within the stipulated period, in full or part it will be open to the **Principal, Government Polytechnic, Takhatpur Disitt – Bilaspur (C.G.)** to recover liquidated damage from the firm at the rate of 2% of the value of undelivered goods per month or part thereof, subject to a maximum of 5% of the value of undelivered goods. Alternatively, it will also be open to the Principal, Government Polytechnic Takhatpur Disitt – Bilaspur (CG) to arrange procurement of the required goods from any other source at the risk and expenses of the tenderer.
50. The undersigned is not responsible for any loss or damage to the equipments during transit irrespective of the fact that they are insured or not insured or delivery is ex- go down or factory station.
51. No claim shall be entertained in respect of interest on Earnest Money/Security deposit/ Tender Deposit.
52. Inspection of the equipment will be carried out at the institution after receipt of the equipments. Any request for the inspection of the same at the firm's factory/ go down/ showroom etc. will not be accepted.
53. Illustrated operation manuals, pamphlets/catalogue/literature/working instructions, trainers, software and hardware, erection/ wiring details as the case may be of the ordered equipments must be supplied in suitable damp proof cover. Without operational/ instruction manual no equipment/machinery will be accepted.

54. If there is any variation of specification of any machine /equipment from tendered specification, it should be clearly mentioned. Specification nearest can also be considered if it is as per technical norms for the given equipment/machinery.
55. Tenderer should mention list of spares, tools and accessories provided along with equipment without any extra cost.
56. Only actual manufacturer or their authorized dealer/distributor may submit the tender .It is mandatory to have ISO/BIS certification for supply/manufacture of the item/equipments/ machineries. Only BIS/ISO /ISI certified item has to be quoted.
57. The bidder shall submit a signed and stamped (on each page) copy of tender document as testimony of acceptance of T&C of tender document.
58. No octroi/excise duty shall be paid by the institution.
59. All prices quoted and other information in this regard having a bearing on the price shall be written both in figures and words in the prescribed offer form. If there is a discrepancy between words and figures, the amount mentioned in words will prevail. All prices should be in Indian National Rupees (INR).
60. Tenderer shall be entirely responsible to pay all Government. (Central and State) GST Taxes & DUTIES, custom duties and levies, sales tax, GST, Service Tax, payable on components, raw materials any other items used for their consumption or dispatched directly to respective location of **Government Polytechnic, Takhatpur Distt – Bilaspur (C.G.)**.
61. The Performance Bank Guarantee (PBG) as per **(ANNEXURE – V)** has to be submitted before the date of Commencement of the execution of the purchase order contract for an amount equal to 10% of the contract value as valid up to 60 days after the date of completion of performance obligations including guarantee/warranty obligations in the form of bank guarantee issued by any nationalized bank in prescribed format. All charges whatsoever such as premium; commission etc with respect to the Performance bank guarantee shall be borne by the selected Bidder.
62. **Award of contract:** Before award the contract, the supplier shall furnish performance security to the Principal, Government Polytechnic Takhatpur, payable at **Takhatpur Distt – Bilaspur (C.G.)** for an amount of 10% to the Contract value through a Bank Guarantee by a nationalized bank, in the prescribed Proforma **(ANNEXURE–V)** as valid up to 60 days after the date of completion of performance obligations including guarantee/warranty obligations. If the desired Performance Security is not deposited by the Tenderer in the specific period, the Earnest Money already deposited with the tender shall be forfeited. In the event of any correction of defects or replacement of defective material during the guarantee/warranty period the warranty for the corrected/replaced material shall be extended to a further period of 24 months and the performance Bank Guarantee for proportionate value shall be extended 60 days over and above the extended guarantee/warranty period. In the event of contract amendment, the supplier shall furnish the amended performance security, rendering the same valid for the duration for the contract, as amended for 60 days after the completion of performance obligations including guarantee/warranty obligations.



63. All provisions of Chhattisgarh Store Purchase Rules 2002 (As Amended 2020), with all amendments upto the date of publication of this tender, shall be applicable.

22/11/2021  
Principal  
Government Polytechnic Takhatpur  
Distt. Bilaspur  
TAKHATPUR DISTT. BILASPUR

**POLYTECHNIC, TAKHATPUR DISITT – BILASPUR (C.G.) 459330****ANNEXURE - I****Format for Technical Bid to be put in envelope A only****(Please provide hard copy as well as soft copy (CD) in MS. Words/M.S. Excel Format in the envelope)**

S. No.	Name of Items along with Make and model	Specifications given in the Tender	Technical Specification the bidder wants to supply as per catalogue/ brochure	Brochure/ literature/ catalogue attached Yes/No	Remark
1	2	3	4	5	6

**Signature:**

(Name &amp; stamp of the Firm/tenderer)

**GOVERNMENT POLYTECHNIC, TAKHATPUR DISITT – BILASPUR (C.G.) 459330****ANNEXURE - II****The Price offer should be submitted in the following format envelope B only****(Please provide hard copy as well as soft copy (CD) in MS. Words/M.S. Excel Format in the envelope)**

Sl. No.	Name of Items along with Make/ Model	Specifications given in the Tenders	Technical Specification which the bidder wants to supply as per Catalogue/ Brochure	Price of the Equipment excluding (GST) In Rs.	(GST) %	GST In Rs.	Cost of the Equipment Inclusive of all taxes & charges sum of column 6&7	Remark
1	2	3	4	5	6	7	8	9

**Signature:**

(Name &amp; stamp of the Firm/tenderer)

ANNEXURE - III

**DECLARATION FOR NOT BLACK LISTED**

Date.....

To,  
The Principal,  
Government Polytechnic Takhatpur,  
Disitt – Bilaspur,(C.G.).

Dear Sir,

Ref.:- Tender No.

I/We ..... hereby confirm that our firm has not been banned or blacklisted by any Government organization/Financial Institution/Court/Public sector Unit/ Central Government.

Place .....

Date .....

Signature of Bidder .....

Name .....

Designation .....

Seal .....

## ANNEXURE-IV

(On Non Judicial Stamp Paper of Rs. 50/-)

## निविदाकर्ता Bid के साथ दिए जाने वाला शपथ-पत्र

निविदाकर्ता फर्म मेसर्स ..... की ओर से मुझे/हमें अधिकृत किया गया है और मैं/हम निम्नलिखित कथन शपथपूर्वक कहता हूँ/कहते हैं कि :-

1. मैंने/हमने निविदा की सारी शर्तें ध्यानपूर्वक पढ़ी हैं और उनसे सहमत हैं तथा उन्हें मानने के लिए वचनबद्ध है।
2. मेरे/हमारे द्वारा संलग्न किए गए सभी दस्तावेज सही हैं और उनमें किसी प्रकार की कांट-छांट नहीं किया गया है एवं गलत जानकारी नहीं दी गई है।
3. मेरे/हमारे द्वारा कामर्शियल बिड में सामग्रीयों के लिए जो स्पेशिफिकेशन दिया गया है। और उनके सपोर्ट में जो भी संबंधित दस्तावेज, कैंटलॉग/ब्रोशर्स आदि संलग्न किए गए हैं उनमें लिखा विवरण निर्माता द्वारा जारी किया गया है एवं मूल रूप में है, और उनमें कोई फेरबदल या कांट-छांट नहीं किया गया है।
4. मेरे/हमारे द्वारा निर्माता से मुझे/हमें जारी अथॉराइजेशन प्रमाण-पत्र जो कि बिड के साथ संलग्न किया गए हैं। वे सही एवं मूल रूप में हैं और उनमें कोई फेरबदल नहीं किया गया है।
5. मैं/हम दिए गए क्रयादेशानुसार सामग्रीयों को निर्धारित समय सीमा में स्पेशिफिकेशन के अनुसार सप्लाई करने के लिए बाध्य है। देर होने या सामग्रीयों के स्पेशिफिकेशन में अन्तर होने पर मुझे/हमें दिए गए क्रयादेश को निरस्त किया जा सकता है, एवं शासन को होने वाले नुकसान की भरपाई मेरे/हमारे द्वारा की जावेगी।
6. टेण्डर के तहत प्राप्त क्रयादेश द्वारा प्रदाय की जाने वाली सामग्रीयों में लगने वाले सभी शासकीय (केन्द्र व राज्य) GST Taxes & DUTIES, custom duties and levies, sales tax इत्यादि का भुगतान करने की सम्पूर्ण जिम्मेदारी मेरी/हमारी होगी।
7. मेरे/हमारे द्वारा दी गई जानकारी असत्य पाए जाने पर मुझे/हमें एवं हमारी फर्म को निविदा में भाग लेने से वंचित किया जा सकता है।
8. उपरोक्त बिन्दुओं की जानकारी गलत पाये जाने अथवा टेण्डर के नियमों का पालन नहीं करने पर हमारी फर्म को **BLACK LIST** किया जा सकता है। जिसकी सम्पूर्ण जिम्मेदारी मेरी/हमारी होगी।

दिनांक .....

हस्ताक्षर .....  
 नाम .....  
 धारित पद .....  
 फर्म का नाम .....  
 (सील सहित) .....

ANNEXURE - V

Performance Bank Guarantee (PBG) FORM

To,  
The Principal,  
Government Polytechnic Takhatpur,  
Disitt – Bilaspur, (C.G.).

**WHEREAS** ----- (Name of supplier) hereinafter called "the Supplier" has undertaken, in pursuance of Contract (Notification of Award) No.----- dated ----- to supply ----- (Description of Goods and Services) hereinafter called "the Contract".

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

**AND WHEREAS** We have agreed to give the Supplier a Guarantee:

**THEREFORE WE** hereby affirm that we are Guarantors and responsible to you, on behalf of the supplier, up to a total of ----- (Amount of the Guarantee in words and figures) and we undertake to pay you, upon your first written demand declaring the Supplier to be in default under the contract aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the ----- day of ----- 2022

Signature and Seal of Guarantors – Authorized officer of Bank

Name and designation of officer

Date

Address of bank and Branch

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## List and Specification of Equipments for Mechanical Engineering

Branch: - Mechanical Engineering

Name of the Laboratory:- Applied Mechanics Lab

S. No.	Name of the Equipment to be procured	Specification
1	Center of gravity apparatus	A simple & economical apparatus for demonstration of geometrical center of gravity of two dimensional objects. Center of gravity of a freely suspended two-dimensional object always lies along the line drawn vertically downward from its point of suspension. Comprises a clear perspex rod mounted on a base with a suspension screw at the top and four laminas of clear acrylic – 1 each of circular, triangular, square and trapezoidal. Each lamina has suspension holes along their periphery. The point of intersection of lines drawn from point of suspension of 2 or more holes of a lamina gives center of gravity of that 2- dimensional lamina. Standard specification with all accessories
2	Inclined Plane surface Coefficient of friction apparatus	<p><b>Capacity Range</b>            0 ~ 5 N</p> <p><b>Accuracy</b>                    0.01°</p> <p><b>Stroke</b>                        130 mm</p> <p><b>Mass of Sled</b>                200 g (500 g optional). Customization is available for other masses</p> <p><b>Approx Instrument Dimension</b>            600 mm (L) x 300 mm (W) x 200 mm (H) Standard specification with all accessories</p>

Branch: - Mechanical Engineering

Name of the Laboratory:- Metrology and Instrumentation Lab

S. No.	Name of the Equipment to be procured	Specification
1	Talysurf Surface Recorder	Display: 4 digits, 10 mm LCD, with backlight Maximum driving stroke: 17.5 mm/0.7 inch Cut off length: 0.25 mm / 0.8 mm / 2.5 mm optional Evaluation length: 1-5 cut off optional Accuracy: Not more than 10% Fluctuation of display value: Not more than 6% Power: Li-ion battery rechargeable Operating condition: Temp. 0-50°C Humidity<80% Standard specification with all accessories
2	Mechanical Comparator	Measuring minimum base size of : 125mm x 125mm and 60mm ø(diameter). Vertical Minimum Range : 130 mm & 130 mm. Horizontal Minimum Displacement : 40 mm. Minimum Throat Depth : 130 mm & 45 mm Minimum Pillar Diameter: 31 mm.
3	Angle slip gauge	Accuracy measurement of any angle • No cumulative errors of division. • Wringing property similar to slip gauges. • High degree of reflectivity which enables them to be used with an autocollimator.  Set A 1 No. each 1, 3, 9, 27 & 41 Degrees 1 No. each 1, 3, 9 & 27 Minutes 1 No. each 6, 18 & 30 Seconds 1 No. Precision square block  Set B 1 No. each 1, 3, 5, 15, 30 & 45 Degrees 1 No. each 1, 3, 5, 20 & 30 Minutes 1 No. each 6, 12 & 30 Seconds 1 No. Precision square block  Standard specification with all accessories
4	Gear tooth vernier	Range mm: M 1- 25 Graduation: 0.02 mm Standard specification with all accessories
5	LVDT Displacement transducer	Measuring rate 2 kHz - 10 kHz LVDT sensor with necessary signal conditioning circuit. 2. Micrometer comparison scale. 3. Manual micrometer driven mechanism for displacement variation. 4. Digital Indicator: - Least Count: - 0.1 mm Digit: - 3 1/2 5. Range – 0 to 20 mm. 6.Range ± 2mm to 50mm 7.Maximum Supply voltage 12V 8.Recommended supply voltage 10V 9. Powder coated enclosure Standard specification with all accessories
6	Slip Gauges Set	Gauge blocks Materials :hardened alloy <u>Tool steels</u> , <u>Tungsten carbide</u> Hardness of 1500 <u>Vickers hardness</u> Dimension :35 × 9 mm Long series blocks are having cross section with holes for clamping two slips together. Block Per Set:112 pieces 1 Block ; 1.0005 mm 9 Block ; 1.001-1.009 mm in Step of 0.001 mm 49 Block ; 1.01-1.49 mm in Step of 0.01 mm 49 Block ; 0.50-24.50 mm in Step of 0.50 mm 4 Block ; 25-100 mm in Step of 25 mm Standard specification with all accessories

Branch: - Mechanical Engineering

Name of the Laboratory:- Automobile Engineering Lab

S. No.	Name of the Equipment to be procured	Specification
1	<b>Computer based single cylinder 4 stroke petrol engine test rig</b>	<p>Computer based single Cylinder 4 Stroke petrol engine test rig</p> <p>The Test Rig should Consist of the following</p> <ol style="list-style-type: none"> <li>Engine: Single cylinder 4 stroke petrol engine of 100 CC capacities. Make Yamaha-Birla.</li> <li>Dynamometer: The Engine is Coupled to Electronic Dynamometer of 4 capacity at 1500 RPM</li> <li>Load Measurement: With energy module: Output: 4-20 mA.</li> <li>P <math>\Theta</math> &amp; PV Plot: <ol style="list-style-type: none"> <li>Piezo Sensor : 1 No for combustion pressure.</li> <li>Piezo Amplifier : 1 No.</li> <li>Crank angle sensor with TDC marker: 1 No</li> <li>Temp. Transmitter : 6 Nos. with sensors.</li> <li>ADC Card: 1 No. with Complete Inter Facing.</li> </ol> </li> <li>Software : Powerful software for studying different characteristics of I.C. Engine e.g. Brake Power Vs Speed &amp; Load, Heat Converted to Brake Power, Heat goes to exhaust &amp; heat unaccounted.</li> <li>Computer with Key board &amp; Colour Monitor.</li> <li>Fuel Measuring Device: Fuel flow Sensor for fuel metering. Fuel tank mounted on sturdy iron stand, burette tube, three way cock, connecting tube &amp; stop clock.</li> <li>Calorimeter: Double Pipe Heat Exchanger to measure the heat goes through exhaust gases.</li> <li>Air Intake Measurement: Air Intake reservoir of size 0.3 X 0.3 X 0.5 m. with orifice plate, U-Tube manometer of 0.3 m height.</li> <li>Instruction Manual: 1 Copy.</li> </ol> <p>Standard specification with all accessories</p>
2	<b>Shock Absorber Trainer</b>	<ol style="list-style-type: none"> <li>Main test stand featuring the wheel, suspension system and drive system.</li> <li>One coil spring.</li> <li>One hydraulic shock absorber.</li> <li>One gas filled shock absorber.</li> <li>One set of chassis weights.</li> <li>One set of axle weights.</li> <li>Computer with Data Acquisition System.</li> </ol> <p>The test stand includes a computer with a data Acquisition system to record and analyze the performance of the suspension and shock absorber. Position sensors are placed on the chassis, axle and road-drum surface. The computer will display in graphic form the oscillation and movement of these factors as the tests are conducted. The data is also recorded in the computer for later analysis. A training manual to be provided during the bidding process to ensure all experiments are met. Standard specification with all accessories</p>
3	<b>Auto repair tool set with tool box - large</b>	<p>One set of following standard tool specifications with following numbers -</p> <ol style="list-style-type: none"> <li>9-Long Ball Point Hex Key 1.5, 2, 2.5, 3, 4, 5, 5.5, 6, 8, 10mm</li> <li>1-Adjustable Wrench 8"</li> <li>10-Comb. Wrench 8, 9, 10, 11, 12, 13, 14, 15, 17, 19mm</li> <li>1.1/4" Dr. 6PT. Socket 4, 4.5, 5, 6, 7, 8, 9, 10, 11, 12, 13mm</li> <li>1.1/4" Dr. 6PT. Deep Socket 8, 9, 10, 12mm</li> <li>1.1/4" Dr. Quick-Release Ratchet</li> <li>1.1/4" Dr. Extension Bar 2"</li> <li>1.1/4" Dr. Universal Joint</li> <li>1.1/4" Dr. Bit Adapter</li> <li>1.1-3/8" Dr. 6PT. Socket 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19mm</li> <li>1.4-3/8" Dr. 6PT. Deep Socket 13, 14, 15, 17mm</li> <li>1.3/8" Dr. Quick-Release Ratchet</li> <li>1.3/8" Dr. Extension Bar 3" 6"</li> <li>1.3/8" Dr. Universal Joint</li> <li>1.1/2" Dr. Quick-Release Ratchet</li> <li>1.2-1/2" Dr. Extension Bar 5" 10"</li> <li>1.1/2" Dr. Sliding Bar</li> <li>1.1/2" Dr. Universal Joint</li> <li>1.1/2" Dr. Adapter 12.5MMx10MM</li> <li>1-Long Nose Plier 6"</li> <li>1-Diagonal Plier 8"</li> <li>1-Slip Joint Plier 8"</li> <li>1-Groove Joint Locking Plier 10"</li> </ol>



	<p> 24.1-Go Through Screwdriver Slotted 6x150mm  25.1-Go Through Screwdriver Phillips #2x150mm  26.151-3/8" Dr. Bit Adapter 10MMx6.3MM  27.2-3/8" Dr. Spark Plug Socket 16,21mm  28.7-1/2" Dr. 6PT. Socket 20, 21, 22, 24, 27, 30, 32mm  29.5-1/2" Dr. 6PT. Deep Socket13, 14, 15, 17, 19mm  30.6-1/2" Dr. 12PT. Socket 10, 12, 14, 15, 17, 19mm  31.2-Screwdriver Phillips #0x100, # 2x100mm  32.1-1/4" Dr. Spinner Handle  33.3-1/4" Dr. 25mm Bits Slotted 4, 5.5, 6.5mm  34.3-1/4" Dr. 25mm Bits Phillips #1, #2, #3  35.6-1/4" Dr. 25mm Bits Hex 2, 2.5, 3, 4, 5, 6mm  37.6-1/4" Dr. 25mm Bits Torx T10, T15, T20, T25, T27, T30  38.1-Finishing Hammer With Wooden Handle 35mm  38.1-Flat File 8"  39.1-Magnetic Pick Up  40.1-Aluminium Flashlight 2AA  41.1-Auto Voltage Tester  42.1-Knife 18mm  43.1- 20pcs Feeler Gauge Set  44.1-1/2" Dr. L-Type Wrench  45.1-Tire Gauge  46.8-L-Type Torx Wrenches T6, T7, T8, T9, T10, T15, T20, T25  47.6-Punch Set  with Tool Box  Standard specification with all accessories </p>
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Branch: - Mechanical Engineering

Name of the Laboratory:- Theory of Machines Lab

S. No.	Name of the Equipment to be procured	Specification
1	Static & Dynamic Balancing Apparatus	<b>Technical details:</b> Drive Motor -- FHP Motor, variable speed, with speed controller Balancing Weight -- 4 Nos. of Stainless Steel Rotating Shaft -- Material Stainless Steel <b>Utilities:</b> - Electricity 0.5 kW, 220 V, Single Phase
2	Working model of IC engine to determine unbalancing force on the I.C. engine	<ol style="list-style-type: none"> <li>1. experimental unit to investigate oscillating and rotating mass forces and moments of a reciprocating engine with up to 4 cylinders</li> <li>2. electronically commutated and speed-controlled drive motor with digital speed display</li> <li>3. continuous adjustment of the angle between cranks</li> <li>4. force sensors to measure forces and moments</li> <li>5. vibration isolation using rubber elements and suitable tuning</li> <li>6. GUNT software for data acquisition via USB under Windows 7, 8.1, 10</li> </ol> <b>features:</b> 1 engine model 1 display and control unit 1 set of accessories (tools, additional masses) 1 GUNT software CD + USB cable 1 set of instructional material

Branch: - Mechanical Engineering

Name of the Laboratory:- Refrigeration &amp; Air Conditioning Lab

S. No.	Name of the Equipment to be procured	Specification
1	Sling Psychrometer, Aspiration Psychrometer Hygrometer humidistats	<b>Sling Psychrometer</b> -Designed for portability (7.5" long x 1" diameter) • Slide rule construction should quickly converts temperature to relative humidity • Built-in water reservoir holds sufficient water for several hours of testing • Thin bulb design gives fast thermal response • Thermometers constructed of shock-resistant glass; stems have deep-etched numerals and 1° scale divisions for easy reading • Accurate to within ±5% R.H. Standard specification with all accessories Aspiration Psychrometer Hygrometer humidistate of Standard specification with all accessories
2	Working model of Domestic Refrigerator and cut section model of Hermitically sealed compressor	<b>1. Domestic Refrigerator.</b> - It should be made out of full size original parts, suitably sectioned to demonstrate the working of the system. • All the components should be clearly visible & labeled. • It should be mounted on Tubular frame over a wooden base; suitable different color painting has to be carried out along with miracle coating for extra gloss and shine. • Painting should be carried in such a way that different colors shall be used for different components. All the unpainted hardware must be electroplated. Standard specification with all accessories <b>2 . Cut Section of Hermitically Sealed Compressor</b> - It should be made out of full size original parts, suitably sectioned to demonstrate the working of the system. • All the components should be clearly visible & labeled. • It should be mounted on Tubular frame over a wooden base; suitable different color painting has to be carried out along with miracle coating for extra gloss and shine. • Painting should be carried in such a way that different colors shall be used for different components. All the unpainted hardware must be electroplated. Standard specification with all accessories
3	Different types of condensers	Of standard make, standard size & specification with all its accessories Air cooled condenser set: a). Bare tube type 165LTR refrigerator condenser. b)Finned tube type condenser 9"x9"x2R fitted with 5w fan motor Water tube condenser: a) Tube in Tube type b) shell & tube type demo models.
4	Different types of Evaporators	Of standard make, standard size & specification with all its accessories Evaporators for refrigerators a) Roll bound Step type b) Roll bound box type

Branch: - Mechanical Engineering

Name of the Laboratory:- Basic Non-conventional Energy Source

S. No.	Name of the Equipment to be procured	Specification
1	Solar Water Heater System with Flat Plate Collector	<p><b>Characteristics :</b>            Outer Casing : Special Engineering Plastic            Inner Container : SS 304 L/G.I. (Specially Treated)            Container Welding : Machine Welding            Pressure withstanding : Capacity 4.5 Bar*            Container Insulation : PUF (Injected)            Collector Design : Screw less anodized housing with auto drain mechanism.            Corrosion resistance : Specially treated            Tank life 5- Year Performance Warranty*</p> <p><b>Technical Specifications :</b>            Type of Absorber : Selective Black chrome with Nickel undercoat            No. of Risers : 9            Size of Collector : 2000 x 1000 x 95 mm            Glass Toughened : 4 mm thick            frame Material : Aluminium Electrophoresis Coating            Back Sheet : Aluminium plane            Insulation : 50 mm thick Fibreglass            Dry Weight : 40 Kg.            Spectrum Absorber Coating Absorptivity <math>\geq 0.94</math>, emmissivity <math>\leq 0.12</math></p>
2	Solar Street Light (30W) System	<p><b>Technical Specifications :</b>            1.Solar panel: Mono crystalline silicon            2.Battery Type: lithium battery.            3.LED lamp(with sensor).            4.Charge time: By sun 5 hours            5.Discharge time: Full Power 10 hours.            6.Discharge time: Saving Mode 20 hours.            7.Working Temperature range( °C ): <math>-30^{\circ}\text{C} \sim +70^{\circ}\text{C}</math>.            8.Colour temperature range(k): 6000k.            9.Mounting height: 5-6m.            10.Space between lights: Range (m) 18-20m.            11.Lamps main material: Aluminum</p>

Branch: - Mechanical Engineering

Name of the Laboratory:- Machine Drawing Lab

S. No.	Name of the Equipment to be procured	Specification
1	Basic wooden geometrical solid	Product Dimensions 14.7 x 14.7 x 15.7 cm Color - Multi For following solid section A triangular prism, A rectangular prism, A cube, A cylinder, A cone, A triangular pyramid, A square pyramid, A sphere, An ellipsoid, An ovoid, Hexagonal prism, pentagonal prism, square prism, octagonal prism, Hexagonal pyramid, etc
2	Woodencut section of different geometrical solids	Product Dimensions 14.7 x 14.7 x 15.7 cm Color - Multi For following solid section A triangular prism, A rectangular prism, A cube, A cylinder, A cone, A triangular pyramid, A square pyramid, A sphere, An ellipsoid, An ovoid, Hexagonal prism, pentagonal prism, square prism, octagonal prism, Hexagonal pyramid, etc
3	Model of different types of Joint	Knuckle joint Cottor joint Pin joint Bolted joint Screw joint etc. Standard specification with all accessories
4	Model of different Types of Bearing	Ball bearing Journal bearing Cylindrical bearing Spherical bearing Needle bearing Tapper ball bearing Standard specification with all accessories
5	Model of Machine section (tool post, eccentric, stuffing box)	tool post, eccentric, stuffing box, connecting rod etc.

Branch: - Mechanical Engineering

Name of the Laboratory:- Material Technology Lab

S. No.	Name of the Equipment to be procured	Specification
1	Image analyzer with camera and computer system. b) To Study Microstructure of some important Brasses and Bronzes.	Image analyzer with digital colour camera ,image grabber card standard software with latest version Computer(desktop), Report:- direct printout of original image , processed image & tabular results. Export:- to MS excel for further modification

Branch: - Mechanical Engineering

Name of the Laboratory:- Fluid Mechanics and Hydraulic Machines Lab

S. No.	Name of the Equipment to be procured	Specification
1	Metacentric Height Apparatus	<p>This apparatus is used to determine the metacentric height of a ship model under load and unload condition, (flat bottomed vessel). This apparatus consists of:</p> <p>A flat bottomed semi-circular ship model of size 380 x 250 x 170mm approx.</p> <ol style="list-style-type: none"> <li>1. A tank of size 60x60x30cm fitted with piezometer tube to measure the level of water. Transparent sheet is provided on the front of tank.</li> <li>2. A pointer to measure the angle of heel upto +/-15°.</li> <li>3. Additional five hanging weights (50 gm. Each) are provided.</li> </ol> <p>The tanks are well epoxy painted in sided to prevent rust hence increase the life of tank</p> <ol style="list-style-type: none"> <li>4. A cross bar arrangement with the provision of angling movable weights at known distance from the vertical axis through C.G.</li> </ol> <p>Size-300 x 150 mm Approx. Material- Stainless Steel Water Tank Size-600 x 400 x 400 mm Approx Tank Window Material- Glass/Perspex</p>
2	Pressure measurements apparatus	<p>This is a board mounted model which demonstrates various types of pressure measurement devices used in common practice. The devices incorporated are</p> <ol style="list-style-type: none"> <li>i) Single well Manometer.</li> <li>ii) Differential Manometer.</li> <li>iii) Sensitive Manometer.</li> <li>iv) Pressure Gauge.</li> <li>v) Vacuum Gauge.</li> </ol> <p>These devices are coupled to suction and discharge piping of Hydraulic Bench Pump and a close circulation systems is established, with this set up, the working and operating principle of the pressure measuring devices can be studied</p>

22/11/2021

PRINCIPAL

Government Polytechnic, Nalhatpur  
Distt. Bilaspur, Jharkhand  
TARAPUR, BILASPUR, JHARKHAND

## List and specification of Equipments for Electronics & Telecommunication Engineering

Branch:- Electronics & Telecommunication

Name of the Laboratory :- Network Analysis Lab

S. No.	Name of the Equipment to be procured	Specification
1	Series and Parallel Resonance	<p>The board should be consists of the following built-in parts :</p> <ul style="list-style-type: none"><li>• Three inductances made on ferrite cores, selectable by a switch.</li><li>• Three capacitances with low loss factor, selectable by a switch.</li><li>• Three resistance, selectable by a switch.</li><li>• Parallel plate condenser</li><li>• Adequate no. of patch cords stackable from rear both ends 4/2mm spring loaded plug length 50cm.</li><li>• Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections observation of waveforms.</li></ul> <p>It must be supported by detailed Operating Instructions, giving details of Object, Theory, Design</p>



Branch:- Electronics & Telecommunication

Name of the Laboratory :- Computer Fundamental and Application Lab

S. No.	Name of the Equipment to be procured	Specification
1	Printer	<ul style="list-style-type: none"> <li>• Print Resolution: Up to 600 x 600 dpi</li> <li>• Print Speed: Up to 14 ppm</li> <li>• Print Technology: Monochrome Laser</li> <li>• Connectivity: Hi-speed USB, compatible with USB 2.0 specifications</li> <li>• Supported Media Types: Paper (plain, laser), labels, envelopes, transparencies, postcards, cardstock</li> <li>• Functionality: Print, scan, copy</li> <li>• Power Consumption: Maximum 230 Watts</li> <li>• Energy Star qualified</li> </ul>
2	Switch 24 Port	Switch 24 port <ul style="list-style-type: none"> <li>•IEEE 802.3 10BASE-T Ethernet (twisted-pair copper)</li> <li>•IEEE 802.3u 100BASE-TX Fast Ethernet (twisted-pair copper)</li> <li>•IEEE 802.3ab 1000BASE-T Gigabit Ethernet (twisted-pair copper)</li> <li>•IEEE 802.3z Gigabit Ethernet (fiber) ANSI/IEEE 802.3 •Auto-negotiation •IEEE 802.3x Flow Control</li> </ul>
3	Online UPS	Warranty for battery 1 Rating in kVA : 3.0 kVA Backup Time: 15 Minutes Technology IGBT-PWM with inbuilt isolation transformer Warranty for UPS (Years)-1 Minimum VAH (VAH): 400 Output power Single phase 230V +/-1% sinewave 50 Hz Input Power single phase 160V - 260V sinewave,50Hz

Branch:- Electronics &amp; Telecommunication

Name of the Laboratory :- Electrical &amp; Electronics Measurements Lab

S. No.	Name of the Equipment to be procured	Specification
1	Wheatstone bridge trainer kit	<ul style="list-style-type: none"> <li>• Bridge: wheatstone</li> <li>• Waveform: sine</li> <li>• Potentiometer: 1k &amp; 10 KOhm, helical 10 turn pot mounted with dial for easy measurement</li> <li>• Fixed Resistance: 10 M, 1M, 10k, 1k, 100 &amp; 10 Ohm available through selector switch</li> <li>• Variable Power DC Supply: 0-15 V</li> <li>• Interconnections: 2 mm Banana socket.</li> <li>• Test points: 3 nos.</li> <li>• Power Supply: 230 V<math>\pm</math> 10% AC, 50/60 Hz</li> </ul> Power Consumption: 3 VA approximately.
2	Power Measurement using CT & PT It should have following features :	<ul style="list-style-type: none"> <li>• High resolution and accurate meters</li> <li>• Digital Voltmeter, Ammeter and Wattmeter</li> <li>• Internal variable power source</li> <li>• Real time appearance of CT with facility to change primary turns</li> <li>• Provided with all the accessories including rheostat to perform experiment</li> <li>• Designed by considering all the safety precautions</li> <li>• Learning material CD</li> </ul> It should have following Technical Specifications : <ul style="list-style-type: none"> <li>&gt; <b>Mains Supply</b> : 230V<math>\pm</math>10%, 50Hz</li> <li>&gt; <b>Variac</b> <ul style="list-style-type: none"> <li>Input : 230V AC                      Output : 0-270V AC</li> <li>Current Rating : 5A</li> </ul> </li> <li>&gt; <b>Ammeter (2 nos.)</b> <ul style="list-style-type: none"> <li>Display Resoluti: 0.01A AC                      Range Min/Max : 0.1/5A</li> </ul> </li> <li>&gt; <b>Voltmeter (2 nos.)</b> <ul style="list-style-type: none"> <li>Display Resolution : 1V AC                      Range Min/Max: 10V/300V</li> </ul> </li> <li>&gt; <b>Wattmeter</b> <ul style="list-style-type: none"> <li>Display Resolution : 1W</li> <li>Range Min/Max: 15/1500W</li> </ul> </li> <li>&gt; <b>Current Transformer</b> <ul style="list-style-type: none"> <li>CT Ratio : 1:10                      Secondary Current Rating 2A</li> </ul> </li> <li>&gt; <b>Potential Transformer</b> <ul style="list-style-type: none"> <li>PT1- Primary : 230V                      Secondary : 115V</li> <li>PT Ratio : 1:2</li> </ul> </li> <li>&gt; <b>PT2</b> <ul style="list-style-type: none"> <li>Primary : 230V                      Secondary : 57.5V</li> <li>PT Ratio : 1:4</li> </ul> </li> <li>&gt; <b>Rheostat</b> : 220<math>\Omega</math>, 2.8A</li> <li>&gt; <b>MCB</b> : 2A (SPN)</li> </ul>
3	Digital Multimeter	(1) 3.5 Digit 6000 Count LCD , (2) Auto Ranging, (3) 600mV- 1000V DC, (4) 600mV- 750V AC TRMS (5) 600 $\mu$ A- 20A DC, (6) 600 $\mu$ A- 20A AC TRMS, (7) 600 $\Omega$ -60M $\Omega$ , Resistance (8) 9.999nf- 9.99mf, Capacitance (9) 99.99Hz-20.00MHz, Frequency (10) Diode Test, Data Hold , Audible Continuity, Auto Power off & Low Battery Indicator
4	Digital Panel Meters	(1) Basic measurement accuracy 0.1% & speed upto 10 meas / sec (2) Large LCD display with bright white backlight (3) Ultra low power consumption, battery powered for 2 hours of continuous use (4) Automatic identification function (Ai). (5) Percentage display & 4 tolerance comparator : 1%, 5%, 10% & 20% (6) 9V battery & External power supply (7) Automatic correction function with datahold, max. / min. / average recording (8) Utility function configuration & current setup recovery after power off (9) Standard Mini-USB interface, SCPI compatible (10) Auto power Off (11) Constant output impedance : 100 ohm
5	Air Blower	<ul style="list-style-type: none"> <li>• Dual function blower with blowing and extracting functions</li> <li>• Powerful 600 W motor</li> <li>• Air flow of 3.3 cubic meter per min for powerful cleaning performance</li> <li>• Variable speed control provides extra versatility in different applications</li> <li>• Ergonomic handle design and good weight of balance to reduce fatigue</li> <li>• Easy-to-change carbon brush allows fast servicing</li> <li>• 3-meter power cord for more flexible work</li> <li>• Power Consumption: 600 watts</li> <li>• No Load Speed: 16000 RPM</li> <li>• Power Requirements: 230 V</li> </ul>

Branch:- Electronics & Telecommunication

Name of the Laboratory :- Microprocessor & Application Lab

S. No.	Name of the Equipment to be procured	Specification
1	8085 Trainer Kit microprocessor kit with LCD display	<ul style="list-style-type: none"><li>• It should be based on 8085 CPU operating at 6.144 MHz.</li><li>• It should have 8KB of RAM</li><li>• It should have 8K Monitor EPROM</li><li>• Peripheral like 2X 8255,8253, RS-232 using SID/SOD lines</li><li>• It should have keyboard with six 7- segment display using 8279</li><li>• It should work on Power Supply of 230V±10%,50/60Hz</li><li>• User manual with sample programs should be provided.</li></ul>

Branch:- Electronics & Telecommunication

Name of the Laboratory :- Analog Electronics Lab

S. No.	Name of the Equipment to be procured	Specification
1	Spectrum Analyzers	(1) 1.5GHz Frequency Range (2) With and Without Built in Tracking Generator (3) Minimum Resolution bandwidth (RBW) 10Hz , (4) Displayed Average Noise Level (DANL) -135dBm, (5) Display 8 Inch WVGA, (6) PC connectivity LAN, USB host, USB device

Branch:- Electronics & Telecommunication

Name of the Laboratory :- Electronics Devices & Circuits Lab

S. No.	Name of the Equipment to be procured	Specification
1	CRO	<p>Alternate Triggering            Bandwidth 50Mhz            Sharp display &amp; Auto focus            Digital Readout with backlit Color LCD            Coupling: AC/DC and Ground            Trigger Types: External,            Trigger system: Automatic and normal            Slope: Positive /Negative            Trigger Bandwidth: 40 mega Hertz            Computer Interface: USB            Component Tester Built in single touch            Power Supply: 230V <math>\pm</math> 10% , 50Hz            Inbuilt Continuity Tester with beep            Accessories should contain:            Two 10X Probes Two BNC-BNC Cables ,Power Cord ,Manual, Calibration Certificates Operating            Temperature range: 0-40 degree Celsius</p>
2	Digital Multimeter	<p>(1) 3.5 Digit 6000 Count LCD ,            (2) Auto Ranging, (3) 600mV- 1000V DC, (4) 600mV- 750V AC TRMS            (5) 600<math>\mu</math>A- 20A DC,(6) 600<math>\mu</math>A- 20A AC TRMS, (7) 600<math>\Omega</math>-60M<math>\Omega</math>, Resistance            (8) 9.999nf- 9.99mf,Capacitance (9) 99.99Hz-20.00MHz,Frequency            (10) Diode Test, Data Hold , Audible Continuity, Auto Power off &amp; Low Battery Indicator</p>

Branch:- Electronics & Telecommunication

Name of the Laboratory :- Advance Communication Lab

S. No.	Name of the Equipment to be procured	Specification
1	PAM/PPM/PWM Trainer kit	<p>On-board signals Sine wave can be generated.</p> <ul style="list-style-type: none"> <li>• Variable frequency</li> <li>• Variable Amplitude</li> </ul> <p>Sampling</p> <ul style="list-style-type: none"> <li>• Internal sampling clock</li> <li>• Duty cycle : 50 %</li> </ul> <p>Trainer must have Modulation techniques</p> <ul style="list-style-type: none"> <li>• Pulse amplitude modulation</li> <li>• Pulse width modulation</li> <li>• Pulse position modulation</li> </ul> <p>Demodulation</p> <p>Inbuilt demodulation circuit</p> <p>On-board filter and AC amplifier</p> <p>Test points</p> <ul style="list-style-type: none"> <li>• it should be given different test points to observe various intermediate signals</li> </ul> <p>Power supply</p> <p>GND, +5V, +12V, -12V</p> <ul style="list-style-type: none"> <li>-It should also perform voice communication.</li> <li>-it also includes microphone and speaker.</li> <li>- Multimedia based interactive User manual with connection diagram</li> <li>-sufficient numbers of patch cord if required.</li> </ul>

Branch:- Electronics & Telecommunication

Name of the Laboratory :- Instrumentation & Process Control Lab

S. No.	Name of the Equipment to be procured	Specification
1	Digital Multimeter	<ul style="list-style-type: none"> <li>• Measures DCV, ACV, DCA, ACA, resistance, capacitance, frequency and temperature</li> <li>• Tests diode, transistor and continuity</li> <li>• Data hold</li> <li>• Range selection automatic and manual</li> <li>• Large LCD display</li> <li>• Low battery indication</li> <li>• Auto power off</li> <li>• Full overload protection (indicator)</li> <li>• Shock proof protection</li> <li>• Type: Hand Held</li> <li>• Display: 3.5 Digit</li> <li>• Measurement Type: True RMS</li> <li>• Count: 4000-10000</li> <li>• AC Voltage Measurement: 500-600 Volt</li> <li>• DC Voltage Measurement: 500-700 Volt</li> <li>• AC Current Measurement: 2-5 Ampere</li> <li>• DC Current Measurement: 2-5 Ampere</li> <li>• Resistance Measurement: Up to 50 Mega Ohm</li> <li>• Frequency Measurement: Up to 60 Kilo Hertz</li> <li>• Capacitance Measurement Range: 1 to 100 <math>\mu</math>F</li> <li>• Temperature Measurement: -40 to 400 Degree C</li> </ul> <p>User manual also provided.</p>

Branch:- Electronics &amp; Telecommunication

Name of the Laboratory :- Principles of Communication Lab

S. No.	Name of the Equipment to be procured	Specification
1	PCM DPCM modulator and demodulator trainer kit	<ul style="list-style-type: none"> <li>• Modulator and Demodulator on same board</li> <li>• On-board DDS Signal Generator for standard and Arbitrary signals</li> <li>• Selectable sampling frequencies with respective line speed</li> <li>• On board Transmission effect</li> <li>• On board 2nd order Butterworth Low Pass filter</li> <li>• SMD LED indicators PCM Modulator &amp; Demodulator kit should perform</li> <li>• Study and analysis of Pulse Code Modulation and demodulation. Single bit PCM output at different line speed clock.</li> <li>• Study and analysis of Sample &amp; Hold output by varying the sampling as well as signal frequency. DPCM Modulator &amp; Demodulator kit should perform</li> <li>• Study and analysis of Differential Pulse Code Modulation.</li> <li>• Study and analysis of Sample &amp; Hold output by varying the Sampling as well as signal frequency.</li> <li>• Multimedia based interactive User manual with connection diagram</li> <li>• -sufficient numbers of patch cord if required.</li> </ul>
2	ASK , FSK ,BPSK Modulator and Demodulator Trainer kit	<ul style="list-style-type: none"> <li>• Personalized Learning platform</li> <li>• On-board Data Generator with various data patterns</li> <li>• Selectable data frequencies and data patterns</li> <li>• DDS technology based Carrier Generator</li> <li>• SMD LED indicators Trainer Kit should perform Amplitude Shift Keying Modulation &amp; Demodulation .</li> <li>• Also kit should be used to Learn Integrator and Comparator. Trainer Kit should perform Frequency Shift Keying Modulation &amp; Demodulation.</li> <li>• Also kit should be used to Learn Integrator and Comparator. Trainer Kit should perform Binary Phase Shift Keying Modulation &amp; Demodulation.</li> <li>• Also Kit should be used to Learn Integrator and Comparator.</li> <li>• Multimedia based interactive User manual with connection diagram.</li> <li>• sufficient numbers of patch cord if required.</li> </ul>
3	Sampling & Reconstruction	<ul style="list-style-type: none"> <li>• Crystal controlled pulse generator</li> <li>• Demonstrates sampling and reconstruction as per nyquist criterion</li> <li>• On-board synchronized analog signal generator.</li> <li>• Sampling pulse duty-cycle selectable</li> <li>• Internal/External sampling signal selectable</li> <li>• Separate sample and sample/hold outputs available</li> <li>• On-board second order and fourth order low-pass filters</li> <li>• Audio Input and Output links to show the transmission and reception of real time signal (audio signal)</li> <li>• For audio signal microphone and speaker also given.</li> <li>• <b>Trainer kit should perform the following experiment.</b></li> <li>• Study of Sampling and Reconstruction techniques.</li> <li>• Study Nyquist criteria for Sampling and Reconstructing signal.</li> <li>• Study effect of Sample amplifier and Sample and Hold amplifier on reconstructed signal.</li> <li>• Study effect of Sample /Hold Circuitry on reconstructed waveform.</li> <li>• Multimedia based interactive User manual with connection diagram</li> <li>• sufficient numbers of patch cord if required.</li> </ul>
4	Delta modulation and Demodulation Trainer kit	<ul style="list-style-type: none"> <li>• Modulator and Demodulator on same board</li> <li>• On-board DDS Signal Generator for standard and Arbitrary signals</li> <li>• Selectable Sampling Frequencies</li> <li>• On board Transmission effect</li> <li>• Selectable step size for Integrator</li> <li>• Detailed study of granular noise and slope overloading</li> <li>• On board 2nd order Butterworth Low Pass filter</li> <li>• SMD LED Indicators Delta Modulator &amp; Demodulator kit Should perform</li> <li>• Study and analysis of delta modulation and demodulation.</li> <li>• Study and analysis of sample &amp; hold output by varying the Sampling as well as signal frequency.</li> <li>• Study and analysis of Integrator output at the modulator by varying the sampling frequency.</li> <li>• Study and analyze the improved Integrator output by varying the gain control frequency.</li> <li>• Understand slope overload distortion problem, granular noise problem</li> <li>• Analyze single bit delta modulated PCM output, Integrator output at the demodulator.</li> <li>• Multimedia based interactive User manual with connection diagram</li> <li>• sufficient numbers of patch cord if required.</li> </ul>
5	Spectrum Analyzers	<p>(1) 1.5GHz Frequency Range</p> <p>(2) With and Without Built in Tracking Generator</p> <p>(3) Minimum Resolution bandwidth (RBW) 10Hz</p> <p>(4) Displayed Average Noise Level (DANL) -135dBm,</p> <p>(5) Display 8 Inch WVGA,</p> <p>(6) PC connectivity LAN, USB host, USB device</p>



Branch:- Electronics & Telecommunication

Name of the Laboratory :- Digital Electronics Lab

S. No.	Name of the Equipment to be procured	Specification
1	Digital Multimeter	<ul style="list-style-type: none"> <li>• Measures DCV, ACV, DCA, ACA, resistance, capacitance, frequency and temperature</li> <li>• Tests diode, transistor and continuity</li> <li>• Data hold</li> <li>• Range selection automatic and manual</li> <li>• Large LCD display</li> <li>• Low battery indication</li> <li>• Auto power off</li> <li>• Full overload protection (indicator)</li> <li>• Shock proof protection</li> <li>• Type: Hand Held</li> <li>• Display: 3.5 Digit</li> <li>• Measurement Type: True RMS</li> <li>• Count: 4000-10000</li> <li>• AC Voltage Measurement: 500-600 Volt</li> <li>• DC Voltage Measurement: 500-700 Volt</li> <li>• AC Current Measurement: 2-5 Ampere</li> <li>• DC Current Measurement: 2-5 Ampere</li> <li>• Resistance Measurement: Up to 50 Mega Ohm</li> <li>• Frequency Measurement: Up to 60 Kilo Hertz</li> <li>• Capacitance Measurement Range: 1 to 100 <math>\mu</math>F</li> <li>• Temperature Measurement: -40 to 400 Degree C</li> </ul> <p>User manual also provided.</p>

Branch:- Electronics &amp; Telecommunication

Name of the Laboratory :- Power Electronics Lab

S. No.	Name of the Equipment to be procured	Specification
1	UJT Relaxation Oscillator	<ol style="list-style-type: none"> <li>1. Power supply requirement: 230V AC, 50 Hz.</li> <li>2. Built in Regulated Power supply: +15V DC/100 mA.</li> <li>3. Following parts provided on Single PCB with connecting terminals UJT - 2N2646 - 1 No.</li> <li>4. The complete circuit diagram should be is screen printed on component side of the PCB with circuit and Parts at the same place. The true value of component is printed on component side. the PCB with components on front side is fitted in elegant wooden box having lock and key arrangement The acrylic cover is fitted on PCB to safeguard parts. It has holes for alignment and repair. The testing points are provided with 1.25" tags to connect CRO probe All Trainers are operated on 230V AC mains and must be self-contained unit.</li> <li>5. Standard Accessories: 1. A Training Manual.</li> <li>2. Connecting Patch cords.</li> <li>6. E-Books for Power Electronics : 10 Nos in pdf Format</li> <li>7. Mp4 Video Class for Power Electronics : 40 Classes in Mp4 on DVD / Pen Drive</li> </ol>
2	Power Electronics Trainer	<ol style="list-style-type: none"> <li>1. Power supply requirement: 230V AC, 50 Hz.</li> <li>2. Built in Regulated Power supply : 0-10V DC/100 mA continuously variable 0-50V DC/100 mA continuously variable</li> <li>3. Following parts provided on Single PCB with connecting terminals. Diac - Db3,SCR - BT151, Triac - BT136,UJT - 2N 2647,MOSFET - 2N7000 IGBT - IRG4PC40W</li> <li>4. Accessories : 1. Manual</li> <li>2. Patch cords.</li> <li>5. E-Books for Power Electronics : 10 Nos in pdf Format</li> <li>6. Mp4 Video Class for Power Electronics : 40 Classes in Mp4 on DVD / Pen Drive</li> </ol>
3	Single phase AC Phase Control Using DIAC And TRIAC	<ol style="list-style-type: none"> <li>1. Power supply requirement: 230V AC, 50 Hz.</li> <li>2. Following parts provided on Single PCB with connecting terminals. DIAC - DB3 - 1 No., TRIAC - BT136 - 1 No., 10K, 1W Resistors - 2 Nos., Smoothing Capacitors - 2 Nos.</li> <li>3. 100K Ohm Variable Resistor (Potentiometer) to control AC phase</li> <li>4. The complete circuit diagram should be is screen printed on component side of the PCB with circuit and Parts at the same place. The true value of component is printed on component side. The PCB with components on front side is fitted in elegant wooden box having lock and key arrangement The acrylic cover is fitted on PCB to safeguard parts. It has holes for alignment and repair. The testing points are provided with 1.25" tags to connect CRO probe All Trainers are operated on 230V AC mains and must be self-contained unit.</li> <li>5. Standard Accessories : A Training Manual Connecting Patch Cords</li> <li>6. E-Books for Power Electronics : 10 Nos in pdf Format</li> <li>7. Mp4 Video Class for Power Electronics : 40 Classes in Mp4 on DVD / Pen Drive</li> </ol>

Branch:- Electronics &amp; Telecommunication

Name of the Laboratory :- Fundamental of Electrical Engineering Lab

S. No.	Name of the Equipment to be procured	Specification
1	OC and SC set up of single phase transformer with efficiency regulation	1KVA Transformer with Tapping at 33%, 66% and 100% Built in VARIAC, Built In Voltmeter and Wattmeter, Built In MCB and Indicators, All Shrouded Terminals
2	Digital Multimeter	<ul style="list-style-type: none"> <li>• Measures DCV, ACV, DCA, ACA, resistance, capacitance, frequency and temperature</li> <li>• Tests diode, transistor and continuity</li> <li>• Data hold</li> <li>• Range selection automatic and manual</li> <li>• Large LCD display</li> <li>• Low battery indication</li> <li>• Auto power off</li> <li>• Full overload protection (indicator)</li> <li>• Shock proof protection</li> <li>• Type: Hand Held</li> <li>• Display: 3.5 Digit</li> <li>• Measurement Type: True RMS</li> <li>• Count: 4000-10000</li> <li>• AC Voltage Measurement: 500-600 Volt</li> <li>• DC Voltage Measurement: 500-700 Volt</li> <li>• AC Current Measurement: 2-5 Ampere</li> <li>• DC Current Measurement: 2-5 Ampere</li> <li>• Resistance Measurement: Up to 50 Mega Ohm</li> <li>• Frequency Measurement: Up to 60 Kilo Hertz</li> <li>• Capacitance Measurement Range: 1 to 100 <math>\mu</math>F</li> <li>• Temperature Measurement: -40 to 400 Degree C</li> </ul> <p>User manual also provided.</p>

Branch:- Electronics &amp; Telecommunication


Name of the Laboratory :- Computer Hardware, Installation And Maintenance Lab

S. No.	Name of the Equipment to be procured	Specification
1	Computer Hardware kit	<p>PC trainer mounted in all open fashion with open drawer for keyboard &amp; mouse &amp; LCD Monitor firmly supported on compact Aluminum profile flat demo Rack. For protection of PC motherboard transparent acrylic cover provided. Non-destructive Faults have been implemented through slider &amp; Toggle switches mounted on 5 Panels to teach section wise faults &amp; their troubleshooting. PC trainer may be used as regular lab PC. Trainer uses latest high speed processors &amp; not outdated slow Pentiums. Set of Users Guide &amp; PC H/W theory book provided with each unit</p> <p>Enclosure/accessories: Aluminum profile rack system with telescopic sliding drawer for keyboard, mouse and speakers.</p> <p>Number of Faults: 54</p> <p>System Specifications : Subject to evolve / change as newer &amp; high speed PC models appear in market.</p> <p>Sound card:- Built-in MB, Speaker:- Stereo Speakers. Tool kits Cutter, Stripper, Small nose, Blade Knife, Solder Gun with metal &amp; Flux, Digital Multimeter, Philips Screw driver set (each 1 No.)</p>
2	Router	<p>Processor : Motorola RISC Default DRAM1memory :32 MB Maximum DRAM memory :48 MB Default Flash1memory :12 MB Maximum Flash memory :24 MB WAN :ADSL over POTS—Annex A. LAN :Four-port 10/100BASE-T with autosensing MDI/MDX for autocrossover. Console port :This port can be configured to behave as an auxiliary port (virtual AUX supports modem control for dial backup and out-of-band management). LEDs :10 External power supply :Universal 100-240 VAC Safety</p> <ul style="list-style-type: none"> <li>• UL 1950/CSA 950-95: Third Edition</li> <li>• IEC 950: Second Edition with Amendments 1, 2, 3, and 4</li> <li>• EN60950: 1992 with Amendments 1, 2, 3, and 4</li> <li>• CS-03, Canadian Telecom Requirements</li> <li>• FCC Part 68 U.S. Telecom Requirements</li> <li>• AS/NZS 3260: 1996 with Amendments 1, 2, 3, and 4</li> <li>• ETSI 300-047</li> <li>• TS 001 with Amendment 1</li> <li>• EMI</li> <li>• AS/NRZ 3548: 1992 Class B</li> <li>• CFR 47 Part 15 Class B</li> <li>• EN60555-2 Class B</li> <li>• EN55022 Class B</li> <li>• VCCI Class II</li> <li>• ICES-003, Issue 2, Class B, April 1997S</li> <li>• IEC 1000-3-2 Immunity</li> <li>• IEC 1000-4-2 (EN61000-4-2)</li> <li>• IEC 1000-4-3 (ENV50140)</li> <li>• IEC 1000-4-4 (EN61000-4-4) ADSL</li> </ul> <p>ST-Micro DynaMiTe (formerly Alcatel Micro Electronics) ADSL Chipset (20150):</p> <ul style="list-style-type: none"> <li>• T1.413 ANSI ADSL DMT issue 2</li> <li>• G.992.1 ITU G.DMT support</li> <li>• G.992.2 ITU G.Lite support</li> <li>• G.992.3 ITU G.hs ADSL type negotiation</li> </ul> <p>The chipset does not provide interoperability with carrierless amplitude modulation/phase modulation (CAP)-based ADSL lines Power ratings</p> <ul style="list-style-type: none"> <li>• AC input voltage: 100 to 250 VAC, 50 to 60 Hz</li> <li>• Power consumption: 6 to 10W (idle-maximum consumption)</li> </ul> <p>Power supply rating: 15</p>

Branch:- Electronics &amp; Telecommunication

Name of the Laboratory :- Basic Electrical and Electronics Engineering Lab

S. No.	Name of the Equipment to be procured	Specification
1	Series and Parallel Resonance	The board consists of the following built-in parts : <ul style="list-style-type: none"> <li>• Three inductances made on ferrite cores, selectable by a switch.</li> <li>• Three capacitances with lowloss factor, selectable by a switch.</li> <li>• Three resistance , selectable by a switch.</li> <li>• Parallel plate condenser</li> <li>• Adequate no. of patch cords stackable from rear both ends 4/2mm spring loaded plug length 50cm.</li> <li>• Good Quality, reliable terminal/sockets are provided at appropriate places on panel for connections observation of waveforms.</li> <li>• Strongly supported by detailed Operating Instructions, giving details of Object, Theory, Design</li> </ul>
2	OC and SC set up of single phase transformer with efficiency regulation	1KVA Transformer with Tapping at 33%, 66% and 100% Built in VARIAC, Built In Voltmeter and Wattmeter, Built In MCB and Indicators, All Shrouded Terminals
3	Three Phase Induction Motor	Machine with Mechanical Loading Arrangement • Provided with Digital Tachometer • Control board consist of high grade FRP material to provide utmost safety to the users • Machine with Class "B" Insulation • Heavy Duty Base/Channel • Brake-Drum/Pulley with heat suppression facility • Equipped with supply indication lamps • Designed by considering all the safety standards • Diagrammatic representation for the ease of connections • Exclusive and Compact Design • Product Tutorial (CD)
4	Electro Technology Trainer Kit	List of Experiments should be performed: i) DC circuits fundamentals : Ohms Law, Resistors in series, parallel. Power in DC circuit, Kirchoff's voltage, current law, Thevenin's Theorem. ii) AC circuit fundamentals Single Phase : Sine wave alternating current, Voltage. Average RMS values, AC through inductance and power, series R-L circuit and power, series R-C circuit and power, series R-L circuit and power. iii) AC circuit fundamentals:- Three Phase : Balanced three phase resistive load STAR DELTA connection

  
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