

Government Women's Polytechnic College Shivaji Nagar, Bhopal – 462016 (M.P.)

Approved by AICTE & Affiliated to RGPV Bhopal

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Estb. 1964

**e-Tender for Procurement of Equipments of
Civil, Mechanical ,Electrical Engineering and Basic
Science Labs of
Raisen and Lateri Polytechnic Institutes**

Tender no. GWPBPL/STORE/2019-20/2176

Total Pages 25 and Annexures 9,10,11,12

**Office Of The Principal, Government Women's Polytechnic College
Bhopal,
Bhopal M.P.**

No. GWPBPL/ STORE/2019-20/ 2176

Date: 04 /11/2019

e- Tender notice (NIT)

Online bids (Two bid system) are invited for supply and installation of equipments for Civil, Mechanical, Electrical Engineering and Basic Sciences laboratories of **Raisen and Lateri Polytechnic Institutes** ,from reputed manufacturers or authorized dealers/resellers having relevant experience and fulfilling the desired terms and conditions. Last date of bid submission is 28 Nov 2019 as per the schedule and further details described in detailed tender document available at www.mptenders.gov.in. All bids will be opened as per the standard procedure of e-Tendering system.

All corrigendum/ amendments/changes, if any will only be issued and made available at www.mptenders.gov.in.

Principal

Key Dates and Time

S.no.	Description	Date and Time
1	Availability of tender document at www.mptenders.gov.in .	07/11/2019
2	Online bid document purchasing end date	27/11/2019 till 05:00 PM
3	Bid closing for submission of online bids	28/11/2019 at 03:00 PM
4	Submission of hard copy of Technical bid (Envelop –A) and Tender Document along with EMD	28/11/2019 at 03:00 PM
5	Online opening of the Technical bids	30/11/2019 at 12:00 Noon
6	Online opening of the Financial bids	30/11/2019 at 03:00 PM

Note:

- ***Details in Soft copy submitted online (In prescribed Excel & Word Format) and Hard Copy of the Bid should be same, in case of any difference/discrepancy Soft Copy will be considered as final.***
- ***Any objection/dispute related to tender, will not be entertained after opening of technical bid.***

1. Details of Tender:

The online (two bid system) tenders are invited by **Principal, Government Women's Polytechnic College Bhopal**, (hereinafter referred as Tender Inviting Authority and/or Tender Acceptance Authority and/or Ordering Authority), for the equipments of following Labs at **Raisen and Lateri Polytechnic Institutes**, as per the detailed specifications as prescribed in annexures and other important details mentioned against each lab in **Table -I**:

S.No.	Description	Tentative Amount in Lakhs	Earnest Money Deposit Amount in Rs.	Bid Document Price in Rs.	Remarks/ Annexure No.
1	Electrical Engineering	25	75,000	2000	9
2	Mechanical Engineering	210	6,30,000	5000	10
3	Civil Engineering	80	2,40,000	5000	11
4	Basic Sciences	6	18000	2000	12

Bidders will have to purchase and submit separate tenders for each one of the **Labs** and related **equipments** mentioned above. Bids for each lab will be evaluated individually and shall have no interlinking with other labs.

2. Eligibility Criterion:

The Tenderers should fulfill the following eligibility criteria:

- a. The Tenderer should be Manufacturer or Authorized Dealer/Reseller having relevant License of Manufacturer/ Authorized Dealer/Reseller and, such a Registration should be valid as on the date of Tender submission. **(Annexure -3)**
- b. The Tenderer should have achieved annual turnover of Rs.300 Lakh (every FY) in the last three financial years, backed by practicing chartered accountant.

- c. The Tenderer (and tenderer's principal manufacturer, if tenderer is Authorized Dealer/ Reseller) should not be blacklisted either by the Tender Inviting Authority or by any State Government or by Government of India. An undertaking by the tenderer should be submitted in this regard certifying that the tenderer or its principal manufacturer (if applicable) is eligible to participate in the bid process.
- d. The Manufacturer should be in the business of manufacturing of similar equipment for a period not less than 3 Years.
- e. The Tenderer should be in the business of similar equipments for more than one year and furnish the details of similar works in Central/State Government/Autonomous Institutions /Universities /Reputed Private Organizations etc. in **Annexure – 4**.
- f. The Tenderer must submit the latest GST certificate and Income Tax returns of last three years.
- g. The Tenderer must submit the Form – “A” on letterhead with signature & stamp. (**Annexure -2**)

2. Earnest Money Deposit (EMD):

- a. All tenders must be accompanied with Lab-wise EMD (payment mode online NEFT/RTGS) along with Technical (Physical) bid. A soft copy and other details are also to be submitted online as per the standard e- Tendering process of MP E-procurement portal www.mptenders.gov.in.
- b. The EMD should be submitted through online transfer either by Online or NEFT/RTGS through www.mptenders.gov.in . Earnest Money submitted in any other form will not be accepted and the tender will be rejected.
- c. Industries registered as Small scale industrial units with the NSIC/Director of Industries, Government of Madhya Pradesh, Bhopal only will be exempted from Tender document fee and depositing the Earnest money; however, they should send a true copy of the certificate for claiming the above exemption. Firms registered with the Director General of Supplies and Disposals and small Scale Industrial Units registered with Central Govt. or

with other State Government are not exempted from depositing earnest money

- d. The EMD of all unsuccessful Tenderers shall be returned within 15 days of signing of contract with successful Tenderer(s).
- e. The EMD of successful Tenderer shall be returned after signing of contract by successful Tenderer(s).
- f. The EMD will be forfeited, in case Tenderer withdraws its Tender during the validity of bids OR the successful bidder who fails to sign the contract agreement.

3. Validity of Tender:

- a. The Tender will be valid for a period of 01 Year after the due date of submission of Tenders. A Tender valid for a shorter period shall be rejected by the Tender Inviting Authority as non-responsive
- b. In exceptional circumstances, prior to the expiration of the Tender validity, the Tender Inviting Authority may request the tenderer to extend the Tender validity for further period as deemed fit. The request and the responses thereto shall be made in writing. A Tenderer may refuse the request without forfeiting its EMD. A Tenderer, agreeing to the request will not be required or permitted to modify its Tender.

4. Preparation and submission of Tender:

- a. Tenders are to be submitted as mentioned in **Table-I**.
- b. The Tender should be typewritten and every correction and interlineations in the bid should be attested with full signature by the tenderer, failing which the bid will be treated as ineligible. Corrections done with correction fluid should also be duly attested.
- c. All documents/papers should be numbered, signed and sealed by the Tenderer on each page.

- d. The Tender is required to be prepared and submitted in two parts viz. **'Part A - Technical Tender'** and **'Part B - Financial Tender (Annexure - 9, 10,11,12)'**.
- e. The **'Envelope A- Technical Tender'** shall contain all essential documents for Technical Tender. Such documents to include the following: **(Online & Physical)**
 - i. Duly filled Checklist as per format given in **(Annexure –8)**
 - ii. Duly filled and signed **Form –“A”** as per format. **(Annexure-2)**
 - iii. Authorization Letter – **(Annexure -3)**
 - iv. Past work order details as per format given in **(Annexure–4)**
 - v. Duly filled and signed Technical Tender Form as per format given in **(Annexure – 5)**.
 - vi. **Earnest Money Deposit** (as mentioned in **Table -I**)
 - vii. Self-attested copy of firm's registration certificate
 - viii. Self-attested copy of registration in GST number.
 - ix. Self-attested copy of registration in PAN number.
 - x. Annual turnover statement of last three financial year backed by practicing chartered accountant.
 - xi. The **'Envelope B-Financial Bid'** containing Price Schedule should be submitted **Online Only** at www.mptenders.gov.in in the format available **(Annexure –9,10,11,12)** on or before the Key date and time. **No hard copies of Financial Bid are to be submitted.**
 - xii. Late tenders shall not be accepted.

5. Tender Rates:

- a. Tender has been called for in the names of Items for Civil Engineering, Mechanical Engineering, Electrical Engineering and Basic Sciences laboratories. The Tenderers should quote the rates for the Items mentioned in **Annexure–9,10,11,12** separately.
- b. The composition and **Technical Specifications** of each item should be as per details given in **Annexure – 9 ,10,11,12**
- c. Any variation, if found, shall have be indicated in the deviation statement given in **Table-II**, and will be reviewed by competent committee. Such deviations, if not approved by such Committee, may result into the rejection of the tender.

- d. The Tenderer should mention the name of manufacturer of the item being quoted.
- e. Rates inclusive of Customs duty, transportation, insurance, pre inspection charges and any incidental charges, but exclusive of **GST**, should be quoted for each of the required item, and separately on door delivery basis (FOR Destination, at Raisen and Lateri Polytechnic Stores) as per format of Price Schedule (**Financial Bid**) given in **Annexure - 9,10,11,12**.
- f. Pre inspection (s) of the item (**if mentioned in Annexure- 9,10,11,12 against that particular item**), at the supplier/manufacturer site by a experts of tender inviting authority, will have to be arranged by the tenderer. The item shall be procured only if the experts finds the items to be supplied of appropriate quality and specifications as provided in respective Annexure.
- g. Quoted rates are valid up to one year from the date of signing of contract agreement and shall be fixed during the validity of the contract. **GST variations**, if any, may be duly incorporated.

6. Deviation:

If the Tenderer submits the offer with deviation for any item, then Deviation statement, as per the format given in **Table-II**, should be submitted for every offer. In the absence of this the purchaser reserves the right to accept or reject the bid of that particular item. No other formats will be accepted. In absence of deviation statement, the tender will be rejected.

Table-II (Deviation Statement Format)

S.No.	Specification of Machine/ Equipment mentioned in Tender Enquiry	Specification of Machine/ Equipment offered by the Tenderer	Deviations, if yes, indicate the deviation & whether it on + ve side & how

7. Opening of Tenders:

- a. The Tenders shall be opened at the scheduled date, time and venue by the committee constituted by the **Principal, Government Women's Polytechnic College Bhopal**. The Tenderers' representative may attend the Tender opening.
- b. During the tender opening as above, the envelopes containing Technical Tender (**Technical Bid- (Envelop A)**) shall be opened first Online & Physical. The envelopes containing Price Tender (**Financial Bid (Envelop B)**) - **Annexure - 9,10,11,12** shall be Opened Online Only on Scheduled Date & Time of the bidders who qualify in the Technical Bid.
- c. In the event, the date of opening as above is declared government holiday; the tenders shall be opened at the same time on the next working day.

8. Evaluation of Tenders:

- a. The purchase/ Competent committee shall evaluate the tender with reference to technical requirements and various other commercial criteria given in the Tender Document.
- b. The specifications of each item quoted by bidders in **Deviation statement** (Table-II), Technical Tender Form as per format given in **Annexure – 5**, and **supporting documents if any**, will be evaluated first by the competent committee and approved.
- c. The items which are not as per the specifications, **will be rejected and shall not be considered in financial bid**, even if the quoted rates are lowest. The decision of competent committee in this regard shall be final and binding to all the bidders.
- d. The rate per unit of **only the approved items, having desired specifications** for the tendered quantity indicated in the **Annexure -9,10,11,12**, shall be considered for evaluation of Price and determining L-1 Tenderer.
- e. No complaint shall be entertained by the Tender Inviting Authority after the opening of financial bid.

9. Award of Contract:

- a. The Tenderer who has quoted lowest unit rate for an item shall be considered for award of contract.
- b. The successful Tenderer shall execute an agreement (As per format given in **Annexure – 7**) on a Non-judicial stamp paper of value of Rs.1000/-(stamp duty to be paid by the tenderer) within 15 days from the date of the intimation from Tender Inviting Authority, informing that his tender has been accepted.
- c. If the successful Tenderer fails to execute/sign the agreement within the specified time or withdraw his/her tender after the intimation of acceptance of his/her tender or owing to any other reasons, his purchase order shall be cancelled and the **EMD** deposited by him with the tender shall stand forfeited by the Tender Inviting Authority besides debarring the tenderer for a period of one year.

10. Placement of Purchase Orders and Delivery Requirements:

- a. The Tender Inviting Authority shall place individual Purchase Orders for supply of Items during the period of one year from the date of signing of contract with successful Tenderer(s). **Principal, Government Women's Polytechnic College, Bhopal**, reserves the right to extend the validity of purchase order further by 3 months on the same rates and terms & conditions of the contract.
- b. The supplier should complete the **supply and installation** of the ordered equipments at the respective Labs of the **Raisen and Lateri Polytechnic Institutes** within 30 days from the date of issue of purchase order.
- c. If at any time the Tenderer has, in the opinion of the Tender inviting authority (**Principal, Government Women's Polytechnic College, Bhopal**), delayed the supply of Items due to one or more reasons related to force Majeure events such as riots, mutinies, wars, fire, storm, tempest or other exceptional events, the time for supplying the Items may be extended by the Tender inviting authority/ordering authority at its discretion for

such period as may be considered reasonable. However, such extension shall be considered only if a specific written request is made by the Tenderer within 7 days from the occurrence of such event. The exceptional cause does not include scarcity of raw material, power cut and labour disputes.

- d. The **Principal, Government Women's Polytechnic College Bhopal** reserves the rights for any changes/cancellation/rejection of any part or whole tender, without assigning any reason what so ever.
- e. Warrantee/Guarantee should be for a period of minimum 1 year.
- f. All consignment must be dispatched freight paid to the **Raisen and Lateri Polytechnic Institutes**. "To pay" Railway Receipt/Freight Receipts will not be accepted. Loading /Unloading charges shall be borne by the supplier.
- g. It must be noted that normally all correspondence and transactions will be made only with the parties whose tenders have been accepted and not with anybody else.

11. Quality Testing Requirements:

- a. **The Items to be supplied shall be of the best quality and shall comply with the specifications given in the Tender Document.**
- b. The Tender inviting authority may get the items inspected by such person or persons he deems fit and to reject such of these items as in his opinion do not come up to the specification. The decision of the **Principal, Government Women's Polytechnic College Bhopal** will be final in such cases. The rejected items will be returned on the bidder's cost.
- c. If any of the Items supplied by the tenderer, found to be 'Not of Standard Quality' after the delivery, the tenderer should supply the whole Item quantity again irrespective of consumption of that particular. The balance stock, if any, should be taken back within 7 days by the supplier at his/her own cost otherwise the authority will destroy it and no claim in this regard shall be entertained.

12. Payment Terms:

- a. The 100% payment shall be released early from the date of receipt and satisfactory installation of ordered Items and upon submission of claim for payment supported by Invoice (in triplicate). However, if supplied Items are found 'not of standard quality', then whole payment will be withheld and shall be released only after receipt of replacement of Items which were found not of standard quality.
- b. At the time of release of payment, any deduction towards delayed deliveries shall be made from the claim amount.

13. Penalty Conditions:

- a. In case the delivery period is extended with liquidated damages, the Ordering Authority shall impose liquidated damages @ 0.5% per forth night of the quoted price of the delayed items or part thereof until the actual delivery is made up to a maximum deduction of 5% of the contract price.
- b. Once the maximum is reached the purchaser may consider termination of the order in part or full. In such case, the Earnest Money Deposit (EMD) submitted by the Tenderer shall be forfeited.

14. Settlement of Disputes

- a. The purchaser and the supplier shall make every effort to resolve, amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the contract.

- b. In the event of any dispute arising out of the tender or orders such dispute would be subject to the Bhopal jurisdiction only.
- c. In no event will the Tender inviting authority be liable for any loss of profits, loss of savings, or incidental, indirect, special or consequential damages 'arising out of' or 'in relation to' the present tender.
- d. Neither the Tender inviting authority shall be liable for any claims, losses, costs, damages of any nature whatsoever nor the tenderer shall claim expenses for any cause or causes, including any legal liability arising 'out of' or 'in relation to' the present tender.
- e. The tenderer shall be solely responsible for any deficiency in services and supplies given by him including the quality and specification of items and, the tenderer shall be liable to make good the losses suffered by the Tender inviting authority due to the fault on the part of the tenderer.
- f. The maximum liability of Tender inviting authority shall be limited to the extent of payment of goods delivered as per terms of this tender document. Tender inviting authority shall not bear any other financial liability such as interest on delays etc.
- g. Typographical errors or minor information mismatches should be ignored and not be made point of disputes.
- h. The detailed procedure/manual for participation in e-tendering are available at <https://www.mptenders.gov.in> .

- i. For any technical related queries please call at 24 x 7 Help Desk Number of NIC : 0120-4001 002 , 0120-4200 462 , 0120-4001 005 , 0120-6277 787.

FORMAT OF COVERING LETTER

Ref No:

Date:

To,

**Principal,
Government Women’s Polytechnic College
Bhopal, MP**

Sub: Submission of Tender for Supply of Equipments for Labs of Raisen and Lateri Polytechnic as per Tender

No. GWPBPL/ STORE/2019-20/2176

Dear Sir,

As per terms & conditions of the tender following documents are submitted as under:

1. Form “A” Enclosure No.
2. EMD

Sno	Name of Lab	Earnest Money Deposit	Transaction id	Date	Bank Name

3. Other Testimonials

We have quoted rates for items (Number of quoted item to be mentioned) for each lab as stated below:

The entire item is quoted with brand name & full specification. The technical detail as desired is submitted in prescribed format as per enclosed Annexure.

Authorized Signatory Name & Signature with Seal	
Date	

FORM-A

(To be signed and returned along with the tender)

Ref No:Date:

To,
Principal,
Government Women's Polytechnic College
Bhopal, MP

Sub: Submission of Tender for Supply of Equipments for Labs of Raisen and Lateri Polytechnic as per Tender No./ No. GWPBPL/ STORE/2019-20/2176

Dear Sir,
 I/We

Name of Authorized Signatory	
Name of Bidder	
Address of Bidder	
Phone	
e-Mail	

Have read the Tender rules for the supply of various equipments as per Tender notice at GWP,Bhopal and I/We accept all rules for Tender.

Authorized Signatory Name & Signature with Seal	
Date	

**MANUFACTURERS' AUTHORIZATION FORM
(Suggested Format)**

Ref No:

Date:

To,
**Principal,
Government Women's Polytechnic College
Bhopal, MP**

Dear Sir,

Wewho are established and reputable
manufacturers of (name and description of goods offered) having factories at.....
.....(address of factory) do hereby authorize
M/s..... (Name and address
of Dealer/Reseller) to submit a bid and sign the contract with you for the goods
manufactured by us against the Tender Published by you.

Yours faithfully

(Name)

(Name of manufacturers)

Note: This letter of authority should be on the letterhead of the manufacturer and should be signed by a competent person. This AUTHORIZATION FORM should be attached in the bid.

PROFORMA FOR PERFORMANCE STATEMENT

Tender No.	No. GWPBPL/ STORE/2019-20/2176
Date of Opening	
Name of Bidder	

Name & Address of Purchaser	Order No & Date	Description & Quantity of order item	Order Value (in Rs)	Date of Delivery	Reason of delay in delivery (if any)

Authorized Signatory Name & Signature with Seal	
Date	

TECHNICAL TENDER FORM

(On the original letter head of the Tenderer, should be submitted separately for each Lab)

Ref No: Date: To,

To,

Principal,

Government Women's Polytechnic College

Bhopal, MP

Sub: Submission of Tender for Supply of Equipments for Labs of Raisen and Lateri Polytechnic as per Tender No. GWPBPL/ STORE/2019-20/2176

Dear Sir,

We, the undersigned have examined the above mentioned Tender document. We now offer to supply and deliver Item/Equipment in conformity with your above referred document and as per table below:

S.no	Item Code	Item Name & Description	Make	Specification	Qty.
1				(Attach separate sheets / details/brochures if required)	
2				(Attach separate sheets / details/brochures if required)	

1. If our tender is accepted, we undertake to supply the Item/Equipment in accordance with the delivery requirements given in the Tender document.
2. We agree to keep our tender valid for acceptance as required in the Tender Document, or for subsequently extended period, if any, agreed to by us. We also accordingly confirm to abide by this tender up to the aforesaid period and this tender may be accepted any time before the expiry of the aforesaid period. We further confirm that, until a formal contract is executed, this tender read with your written acceptance thereof within the aforesaid period shall constitute a binding contract between us.
3. We further understand that you are not bound to accept the lowest or any tender you may receive against your above referred tender enquiry.
4. We confirm that we do not stand deregistered/banned/blacklisted/debarred by any Govt. Authorities.
5. We confirm that we fully agree to the terms and conditions specified in above mentioned Tender Document, including amendment/ corrigendum if any.
6. We hereby agree to arrange Pre inspection experts visit for the items mentioned in Annexure 10,11,12,13 , wherever required, at the supplier/manufacturer site.

Authorized Signatory	
Name & Signature with Seal	
Date	

GUARANTEE CERTIFICATE

(On the original letter head of the manufacturer)

Ref No: Date:

To,

Principal,**Government Women's Polytechnic College****Bhopal, MP
Bhopal, MP****Sub:** Submission of Tender for Supply of Equipments for Labs of Raisen and Lateri Polytechnic as per Tender No./ GWPBPL/ STORE/2019-20/2176**Ref: Your S.O.NO. Dated: placed on our Authorized Dealer**

M/s.....

Dear Sir,

With reference to the above, this is to certify that the following item has been supplied by our Authorized Dealer M/s.....

S No	Item Name & Description	QTY
1		
2		

We further certify that the material supplied as above has been duly pre-inspected by us and have been found to be in conformity with specification as per the terms & conditions of the supply order. They are hereby guaranteed for a period of 12 months from the date of receipt at your institute, against any material defects, manufacturing defects (Including assembly installation, commissioning as applicable) and bad workmanship.

In case of any defect, we guarantee to replace the same immediately without at any cost.

Seal & Signature of Dealer	Seal & Signature of Manufacturer
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FORMAT FOR CONTRACT AGREEMENT

(On the Non-Judicial Stamp)

THIS AGREEMENT made the.....Day of.....2019,between_____(here in after "the Purchaser") of the one part and M/s _____ (hereinafter called "the Supplier") of the other part:

WHEREAS the Purchaser is desirous that certain Goods and ancillary services viz. Supply of Tools & Equipments in the tender reference No. GWPBPL/ STORE/2019-20/2176 Dated 04/11/2019, and has accepted a bid by the Supplier for the supply of those goods and services for the sum of Rs. _____/-(Rupees..... only) (hereinafter called "the Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to, and they shall be deemed to form and be read and construed as part of this agreement.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:
 - a. The Letter of Acceptance issued by the purchaser.
 - b. The Notice Inviting Tender
 - c. The supplier's bid including enclosures, annexures, etc.
 - d. The Terms and Conditions of the Contract
 - e. The Schedule of Requirement
 - f. The Technical Specification
 - g. Any other document listed in the supplier's bid and replies to queries, clarifications issued by the purchaser, such confirmations given by the bidder which are acceptable to the purchaser and the entire Addendum issued as forming part of the contract.
3. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide, the goods and services and to remedy defects therein in conformity in all respects with the provisions of the Contract.
4. The purchaser hereby covenants to pay the Supplier in consideration of the provision of the goods and services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.
5. Brief particulars of the goods and services which shall be supplied / provided by the Supplier are as under.

SN	Description of Item	Make	QTY	Unit Price (Rs.)	GST in %	Total value inclusive of GST

6. DELIVERY SCHEDULE:

Supply shall be complete within 30 days from the date of purchase.

IN WITNESS where of the parties here to have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, Sealed and Delivered by the

Said _____ (For the Purchaser)

In the presence of

Signature

Name

Address

Witness 1.

2.

Signed, Sealed and Delivered by the

Said _____ (For the Supplier)

in the presence of

Signature

Name

Address

Witness 1.

2.

CHECK LIST

S No.	Documents	Submitted Y/N	Page No
1	EMD in form of RTGS /NEFT submitted online		
2	Covering Letter duly signed & stamped on letter head		
3	Form – A duly signed & stamped on letter head		
4	Self-attested copy of firm registration Certificate		
5	Self-attested copy of PAN and Income Tax returns for last three years.		
6	Self-attested copy of latest GST Number		
7	Authorization Certificate in case of Authorized Dealer/ Reseller of a Manufacturer		
8	Declaration for not having been debarred/blacklisted either by the Tender Inviting Authority or by any State Government or by Government of India on INR 100 Judicial Stamp		
9	Performance Statement		
10	Turnover Certificate of Minimum Rs. Twenty Lakh issued by practicing CA		
11	Technical Tender Form as per Annexure-5		
12	Deviation statement as per Table-II		
13	Price Schedule (Financial Bid _online submission)		

Authorised Signatory Name and Signature with Seal	
Date	

Part - B
Envelop B - Financial Bid

Annexure -9

(To be filled in prescribed Excel format and uploaded online for Price Bid for each lab separately)

Tender No.	GWPBPL/ STORE/2019-20/2176
Date of Opening	
Name of Bidder	

ANNEXURE-9

SPECIFICATIONS OF EQUIPMENTS FOR ELECTRICAL ENGG. LAB

S.NO	REQUIRED EQUIPMENT	Pre Inspection Required Y/N	Make	REQUIRED QUANTITY IN NO.	Unit Price (inclusive of Pre inspection Charges wherever applicable)	GST in %	Total value inclusive of GST	Remarks
1	<p>3 Phase RLC Load 1 KW (Variable) RLC Load consists of following : -Resistive Load 1 KW:Loading Rheostat 1.5 KW Three Phase (Each Phase of 0.5 KW) in 4 Steps. 3Phase Loading Rheostats is designed to be used as loads in electrical laboratories. High quality Rheostats are mounted inside the specially designed highly ventilated steel cabinet. Selector switches mounted on bakelite front panel for load selection. Fitted on wheels for easy movement. Loading Voltage : 415~440V AC , 50Hz, 3 Phase Loading capacity : 1.5 KW Three Phase (0.5 KW each phase) No of steps : 4 (125W each step) Rheostats : High quality wound with Constantan wire (nickel - copper alloy) -Inductive Load 1 KW, 10 Amp, Three Phase -Capacitive Load 1 KW, 10 Amp, Three Phase</p>	N		1				
2	<p>RHEOSTAT (100 Ohms / 5 Amp) Range: 100 Ohms / 5 Amps Size: 18" x 2 1/4 " Double Tube Material Used : Contact (Double Contact System) - Laminated Phosphorous Bronze, End bands- Brass Nickled, Former- Porcelain Tube Glide Rod- Brass, Side Support- Mild Steel Terminals- 4 mm Bakelite Embedded with Brass, Wire- Nichrome Resistance Wire.</p>	N		1				
3	<p>RHEOSTAT (300 Ohms/ 2 Amp) Range: 300 ohms/2Amps 24" x 2 1/4 " Single Tube Material Used : Contact (Double Contact System) - Laminated Phosphorous Bronze, End bands- Brass Nickled, Former- Porcelain Tube Glide Rod- Brass, Side Support- Mild Steel Terminals- 4 mm Bakelite Embedded with Brass, Wire- Nichrome Resistance Wire.</p>	N		1				

4	<p>Work Bench Electrical With Instruments Work bench 5ft x 2.5ft, Height 2.5ft with all metallic structure fitted with wheels with logging arrangements, provided with drawers with lock and key. The work bench is fitted with the following instruments: a) 3 Phase variac, 28A, 0-470V, b) DSO 100Mhz, 2CH c) Function Generator 25Mhz, d) Dual DC regulated Power supply, 0-30V , 5A e) Digital Multimeter suitable to measure AC / DC current, AC/DC Voltage, etc., f) Soldering & De - Soldering Station g) Multifunction meter to indicate 3 phase voltage, current, frequency, power factor, power, etc. Input Supply 415V , fitted with TPN MCB 32A, Output sockets of 5/15A</p>	N		1				
5	<p>Function Generator Frequency : 0.5 Hz to 5 MHz Function Generators with sine , square, triangle, TTL & DC, 6 digit , Auto ranging 150 MHz Frequency Counter Amplitude Modulation (Internal & External) Internal AM Signal generator 400 Hz/1 kHz Distortion factor : < 0.5% Internal Lin /Log Sweep and External Frequency Modulation CMOS output adjustable from 2 V to 14 V Backlit LCD display for modes and frequency Microprocessor based design</p>	N		1				
6	<p>Anderson Bridge with inbuilt Digital Null Detector In built fixed DC regulated power supply of $\pm 5V \pm 12V$ & $+5V/ 500mA$. Inbuilt sine wave oscillator, frequency 1KHz $\pm 3\%$, amplitude 0-15Vpp. In built 3½ digit digital null detector used as detector On Board three set of two decade dial x(10 W & 100W). On Board four unknown inductance & two standard capacitor are mounted behind the front panel with connections are brought out on front panel. Bakelite used as front panel of 400mm x 225mm & mounted on light weight shock proof plastic cabinet. Circuit diagram of discrete component printed & all important connection are brought out on front panel Power requirement: 220 VAC +10%, 50Hz</p>	N		1				
7	<p>Schering Bridge with inbuilt with Digital Null Detector, Sinewave Oscillator In built fixed DC regulated power supply of $\pm 5V \pm 12V$ & $+5V/ 500mA$. Inbuilt sine wave oscillator, frequency 1KHz $\pm 3\%$, amplitude 0-15Vpp. In built 3½ digit digital null detector used as detector On Board two ratio dial "P" & "Q" each having 10 W, 100W & 1000W. On Board two decade dial x (0.01 mF & 0.01mF). On Board one variable gang capacitor range of 25pF to 500pF On Board six unknown capacitor are mounted behind the front panel with connections are brought out on front panel. Bakelite used as front panel of 400mm x 225mm & mounted on light weight shock proof plastic cabinet.</p>	N		1				

8	<p>Kelvin Bridge (Industrial) with DC Source & Galvanometer To measure the low value Resistance. Multiplier dial is provided on the front panel with ranges X 0.01W, X0.1W, X1W, X10W, X100W. Standard resistance dial & slide wire dial are also provided on the front panel. Two press keys are provided on the front panel marked as coarse and fine. Current reversing switch is provided on the front panel to get the deflection on left or right Hand side in a galvanometer. Terminals are provided on front panel to connect galvanometer & DC source.</p>	N		1			
9	<p>Kelvin Bridge (Student) with DC Source & Galvanometer One ratio box of 1-1W, 0. 1-0.1W, 0.01-0.01W, 10-10W, 100-100W, for connection of Galvanometer. One decade dial of X0.01W. Slide wire of resistance 0.05W with scale of 100 equal divisions. Four terminals for connecting unknown resistance wire. Two terminals are provided for Battery.</p>	N		1			
10	<p>Maxwell Inductance Bridge with inbuilt Digital Null detector, Sinewave Oscillator Multiplier dial is provided on the front panel with ranges X 0.01W, X0.1W, X1W, X10W, X100W. Standard resistance dial & slide wire dial are also provided on the front panel. Two press keys are provided on the front panel marked as coarse and fine. Current reversing switch is provided on the front panel to get the deflection on left or right, Hand side in a galvanometer. Terminals are provided on front panel to connect galvanometer & DC source.</p>	N		1			
11	<p>Weins Bridge (Capacity Measurement) with inbuilt Digital Null Detector, Sinewave Oscillator In built fixed DC regulated power supply of $\pm 5V$, $\pm 12V$ & $+5V/ 500mA$. Inbuilt sine wave oscillator, frequency $1KHz \pm 3\%$, amplitude 0-15Vpp. In built $3\frac{1}{2}$ digit digital null detector used as detector On Board two set of two decade dial x(1W & 10W). On Board six unknown capacitor & two capacitor (0.033mF & 1mF) are mounted behind the front panel with connections are brought out on front panel. Bakelite used as front panel of 400mm x 225mm & mounted on light weight shock proof plastic cabinet. Circuit diagram of discrete component printed & all important connection are brought out on front panel. Power requirement : 220 VAC +10%, 50Hz</p>	N		1			

12	<p>Weins Bridge (Frequency Measurement) with Digital Null Detector with Analog Function Generator 1Hz to 200KHz</p> <p>In built fixed DC regulated power supply of $\pm 5V$ & $+5V/ 500mA$. In built $3\frac{1}{2}$ digit digital null detector used as detector On Board two set of two decade dial x(0.01mF & 0.1mF). On Board three decade dial x(10 W , 100W & 1000W). On Board three decade dial x(1W , 10W & 100W). Bakelite used as front panel of 400mm x 225mm & mounted on light weight shock proof plastic cabinet. Circuit diagram of discrete component printed & all important connection are brought out on front panel. Power requirement : 220 VAC +10%, 50Hz</p>	N		1			
13	<p>Desauty Bridge with inbuilt Digital Null Detector, Sinewave Oscillator</p> <p>In built fixed DC regulated power supply of $\pm 5V$, $\pm 12V$ & $+5V/ 500mA$. Inbuilt sine wave oscillator, frequency 1KHz $\pm 3\%$, amplitude 0-15Vpp. In built $3\frac{1}{2}$ digit digital null detector used as detector On Board two set of two decade dial x(10W & 100W). On Board one decade dial x(0.1mF). On Board six unknown capacitor are mounted behind the front panel with connections are brought out on front panel. Bakelite used as front panel of 400mm x 225mm & mounted on light weight shock proof plastic cabinet. Circuit diagram of discrete component printed & all important connection are brought out on front panel. Power requirement : 220 VAC +10%, 50Hz</p>	N		1			
14	<p>Hay's Bridge with inbuilt Digital Null Detector, Sinewave Oscillator</p> <p>In built fixed DC regulated power supply of $\pm 5V$, $\pm 12V$ & $+5V/ 500mA$. Inbuilt sine wave oscillator, frequency 1KHz $\pm 3\%$, amplitude 0-15Vpp. In built $3\frac{1}{2}$ digit digital null detector used as detector On Board two decade dial x(100 W & 1000W). On Board three decade dial x(10W, 100W & 1000W). On Board two decade dial x (0.01mF & 0.1mF).</p>	N		1			
15	<p>Owen's Bridge</p> <p>Owen's Bridge with Decade Inductance Box with Sine Wave Oscillator & Decade Inductance Box with Sine Wave Oscillator & Inductance & Sensitive Head Phone</p>	N		1			
16	<p>IDMT Over Current Relay Testing Kit</p> <p>Relay Type : Over Current Relay IDMT (Electromechanical Induction Disc Type) Terminals : 4mm Terminals for Trip, Current Output and Input Meters (Digital): 1No. AC Current Meter 0 – 20Amps & 1 No. Digital Timer .0001sec. to 9999sec. (Auto) (96mm x 48 mm) Current Injector : Inbuilt variable current injector 20Amps to create Phantom Fault Current Indicators : Provided on front panel for Mains, Current, Trip and Alarm Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF) Relay Circuit Diagram : Screen Printed on front panel size 700mm x 400mm Power Requirement : 220VAC +10%, 50Hz</p>	N		1			

17	<p>Earth Fault Realy Testing Kit (Electromechanical Type) Relay Type : Earth Fault Relay IDMT (Electromechanical Induction Disc Type) Terminals : 4mm Terminals for Trip, Current Output and Input Meters (Digital) : 1No. AC Current Meter 0 – 20Amps & 1 No. Digital Timer 0001sec. to 9999sec. (Auto) (96mm x 48 mm) Current Injector : Inbuilt variable current injector 20Amps to create Phantom Fault Current Indicators : Provided on front panel for Mains, Current, Trip and Alarm, Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF) Relay Circuit Diagram : Screen Printed on front panel size 700mm x 400mm Power Requirement : 220VAC +10%, 50Hz</p>	N		1				
18	<p>Percentage Bias Differential Relay Testing Kit (Electromechanical Type) Relay Type : Percentage Biased Differential Relay (Electromechanical Induction Disc Type) Terminals : 4mm Terminals for Rheostats to set the biased Current & to vary the Differential Current Meters (Digital) : 1No. AC Current Meter 0 – 20Amps, 2Nos. AC Current Meters 0 – 50Amps & 1 No. Digital Timer .0001sec. to 9999sec. (Auto) (96mm x 48 mm) Current Injector : Inbuilt variable current injector 20Amps to create Phantom Fault Current Indicators : Provided on front panel for Mains, Current, Trip and Alarm Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF) Relay Circuit Diagram : Screen Printed on front panel size 700mm x 400mm Power Requirement : 220VAC +10%, 50Hz</p>	N		1				
19	<p>Transformer Protection using Percentage biased Differential Relay (Microprocessor Type) Relay Type : Percentage Biased Diffrential MIB 202 Relay Terminals : 4mm Terminals for Rheostats to set the biased Current & to vary the Differential Current Meters (Digital) : 2Nos. AC Current Meter 0 – 20Amps, & 1 No. Digital Timer .0001sec. to 9999sec.(Auto) (96mmx48mm) Current Injector : Inbuilt variable current injector 20Amps to createPhantom Fault Current Indicators : Provided on front panel for Mains, Current, Trip and Alarm Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF) Relay Circuit Diagram : Screen Printed on front panel size 900mm x 600mm Power Requirement : 420VAC +10%, 50Hz</p>	N		1				
20	<p>Thermal Over Load Relay Testing Kit Relay Type : Thermal Relay Terminals : 4mm Terminals for Trip, Current Output and Input Meters (Digital) : 1No. AC Current Meter 0 – 20Amps & 1 No. Digital Timer .0001sec. to 9999sec. (Auto) (96mm x 48 mm) Current Injector : Inbuilt variable current injector 20Amps to create Phantom Fault Current Indicators : Provided on front panel for Mains, Current, Trip and Alarm Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF) Relay Circuit Diagram : Screen Printed on front panel size 700mm x 400mm Power Requirement : 220VAC +10%, 50Hz</p>	N		1				

21	Over Voltage Relay Testing Kit (Electromechanical Type) Relay Type : Over Voltage Relay (Electromechanical Induction Disc Type) Terminals : 4mm Terminals for Trip, Voltage Output and Input Meters (Digital) : 1No. AC Voltmeter Meter 0 – 300V & 1 No. Digital Timer .0001sec. to 9999sec. (Auto) (96mm x 48 mm) Voltage Injector : Inbuilt variable voltage injector 250V to create Fault Voltage Indicators : Provided on front panel for Mains, Voltage, Trip and Alarm Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF) Relay Circuit Diagram : Screen Printed on front panel size 700mm x 400mm Power Requirement : 220VAC +10%, 50Hz	N		1				
22	Under Voltage Relay Testing Kit (Electromechanical Type) Relay Type: Under Voltage Relay (Electromechanical Induction Disc Type) Terminals: 4mm Terminals for Trip, Voltage Output and Input Meters (Digital): 1No. AC Voltmeter Meter 0 – 300V & 1 No. Digital Timer .0001sec. to 9999sec. (Auto) (96mm x 48 mm) Voltage Injector : Inbuilt variable voltage injector 250V to create Fault Voltage Indicators : Provided on front panel for Mains, Voltage, Trip and Alarm Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF) Relay Circuit Diagram : Screen Printed on front panel size 700mm x 400mm Power Requirement : 220VAC +10%, 50Hz	N		1				
23	Over Current Relay (Directional Type) Testing Kit (Electromechanical Type) Relay Type : Directional Over Current Relay (Electromechanical Induction Disc Type) Terminals : 4mm Terminals for Trip, Current Output and Input Meters (Digital) : 1No. AC Current Meter 0 – 20Amps & 1 No. Digital Timer .0001sec. to 9999sec. (Auto) (96mm x 48 mm) Current Injector : Inbuilt variable current injector 20Amps to create Phantom Fault Current Indicators : Provided on front panel for Mains, Current, Trip and Alarm Switches : Provided on front panel for Mains, Timer Reset, Test Switch (ON/OFF) Reversing Switch : To reverse the direction of current Relay Circuit Diagram : Screen Printed on front panel Power Requirement : 220VAC +10%, 50Hz	N		1				
24	Advance PLC Trainer kit RS Logic 1000/ licensed software : Digital & Analog , Digital 16 Input 8 Output , Analog 8 Input 8 Output, Delta Based PLC provided with RS232 Serial port for PC Interfacing	N		1				
25	Simens TIA Module S7-1200/Licensed software	N		1				
26	PLC Control panel	N		1				
27	Interfacing Modules for above mentioned PLC Trainer	N		1				
28	- Module For Traffic Light Control	N		1				
29	- Module For DOL Starter Control	N		1				
30	- Module For Star Delta Starter Control	N		1				
31	- Module For Conveyer Belt Control	N		1				
32	- Module For DC Motor Start,Stop Function	N		1				
33	- Module For Water Level Control	N		1				

34	- Module For Temperature Control	N		1			
35	- Module For Sequence Control	N		1			
36	- Module For Elevator Control	N		1			
37	Scada Software:- Allean Bradely	N		1			
38	Scada Software:- wonderware intuch student version :-simens						
39	Module For Elevator Control	N		1			
40	Anchor Insulated Copper PVC Cable 2.5 Sq mm Wire(100m)	N		2			
41	3/20 SWG (PHASE WIRING)(100m)	N		2			
42	3/22 SWG (NEUTRAL WIRE)(100m)	N		2			
43	6 Amp. Modular Switch Board	N		5			
44	TWO WAY SWITCH (10 AMP)	N		10			
45	One Way Modular Switch (10 AMP)	N		10			
46	lamp holders	N		10			
47	40w bulb 3 PVC casing	N		10			
48	MCB (10 AMP)	N		1			
49	FUSES (10 AMP)	N		2			
50	Magic Power BC-A6 10A Battery Charger			1			
51	BATTERY ELIMINATOR	N		1			
52	electrical testing panel	N		1			
53	LUX METER Lux Range: 2000, 20000, 50000Lux Max. Resolution: 1Lux Basic Accuracy: ±5% FS Fast Response: 0.2s Slow Response: 0.4s Cosine & Color Corrected, Analog output, Monitor light levels using outputs; 1mV per count analog output for capturing readings to a recorder, supplied with batteries, light sensor, cable & protective cover	N		1			
54	SMPS Trainer Kit Switched Mode Power Supply (SMPS) using high frequency transformer & high switching transistor has been designed to study the line and load regulation characteristics of SMPS power supplies. Rotary switch for selections of different input voltage & linearity coil for AC filtrations , Bridge rectifier to convert AC into DC DC filtrations circuit is given to filter the impurities i.e. AC components. High frequency transformer and high frequency transistor (BU 508) for switching action. Feed back/ comparator circuit to maintain output voltage constant i.e. +10 % on load. Two meters are provided on the front panel to measure the DC voltage & current. Two bulb holder are mounted on the front panel to connect resistive (Bulb) load across the output. Block diagram printed on front panel & test points brought out on front panel. Power requirement: 230 VAC +10%, 50Hz.	N		1			

55	UPS TRAINER KIT(500 VA) <ul style="list-style-type: none"> • On board controller PCB • On board input/output transformer & chargeable battery • Digital panel meter for current reading • 5 Test points provided on front panel only for observations • 5 Fault switch provided on front panel for fault creation • LED Indicators for status mode • Power Requirement: 220VAC+10%,50Hz 	N		1				
56	TRANSFORMER OIL TESTING KIT(0-80KV) Motorized with digital display INPUT : 230V AC, Single Phase. OUTPUT : 0 –80 KV, center tap earthed, CAPACITY : 1 KVA INDICATION: Mains 'ON' and 'HT' 'ON' Indicating Lamps. METERING : 96 sq. mm. Size back of panel mounting, Moving Coil Rectifier type 0-80Kv Analog Voltmeter or TRMS Digital Voltmeter to monitor output voltage. PROTECTION : Electronic fast acting over current tripping device sensing HT Current directly. MOTORISATION : The unit will be supplied with the rate of rise of voltage @ 2KV/second and in case of motorization failure, the unit can be operated manually. ACCESSORIES :Acrylic Oil Cup with Electrodes, Gauge, 3 Pin Mains Top.	N		1 piece				
57	Digital Earth Tester with Kit 4 Terminal Type Display 3 Digit LCD Range: 10 Ohms & 1000 Ohms Terminals: 4 mm screw type Mains Cum Battery operated	N		1				

Authorized Signatory Name & Signature with Seal	
Date	

Part - B
Envelop B - Financial Bid

Annexure -10

(To be filled in prescribed Excel format and uploaded online for Price Bid for each lab separately)

Tender No.	GWPBPL/ STORE/2019-20/2176
Date of Opening	
Name of Bidder	

ANNEXURE-10

SPECIFICATIONS OF EQUIPMENTS FOR MECHANICAL ENGG. LAB

S.N O	Description of Item	PRE Inspection Required Y/N	Make	REQUIRED QUANTITY in No.s	Unit Price (inclusive of Pre inspection Charges wherever applicable (Rs.)	GST in %	Total value inclusive of GST	Remarks
1	Static & Dynamic balancing Apparatus Drive Motor: FHP Motor, variable speed, with speed controller. Balancing weight: 4 Nos. of Stainless Steel with different sized eccentric mass for Varying unbalance. Rotating Shaft: Material Stainless Steel Supplied with Instruction Manual	N		1				
2	Cam and Follower Apparatus Cam Shaft : Material Stainless Steel Cams: Tangent, Eccentric, Circular Arc, made of hardened alloy – steel. Followers: Roller, Knife edge, Mushroom, made of hardened alloy – steel. Compression Spring : Provided Weights : 1 kg., 500gm, 200 gm & 100gm Motor : Variable speed DC Motor with speed controller Dial Gauge : Baker & Mercer/Standard Make Supplied with Instruction Manual	N		1				
3	Universal Vibration apparatus Exciter Unit : With FHP DC Motor with Speed Control Facility RPM measurement: Digital RPM Indicator with Proximity sensor. Ordinary Chart recorder: For recording Frequency and Amplitude of Vibration. Stop Watch: Electronic Stop Watch. Supplied with Instruction Manual	N		1				
4	Porter Governor Apparatus Spindle : Material Stainless Steel Governor Mechanism Motor: Variable speed, Standard Make, FHP Motor. Control Panel: For speed control of motor. Supplied with Instruction Manual	N		1				
5	Proell Governor Apparatus Spindle : Material Stainless Steel Governor Mechanism Motor: Variable speed, Standard Make, FHP Motor. Control Panel: For speed control of motor. Supplied with Instruction Manual	N		1				

6	<p>Watt Governor Apparatus Spindle : Material Stainless Steel Governor Mechanism Motor: Variable speed, Standard Make, FHP Motor. Control Panel: For speed control of motor. Supplied with Instruction Manual</p>	N		1				
7	<p>Hartnell Governor Apparatus Spindle : Material Stainless Steel Governor Mechanism Motor: Variable speed, Standard Make, FHP Motor. Control Panel: For speed control of motor. Supplied with Instruction Manual</p>	N		1				
8	<p>Single cylinder multi fuel VCR engine with dynamometer testrig with smoke analyser COMPUTERIZED ENGINE TEST SET-UP FOR VARIABLE COMPRESSION RATIO MULTIFUEL ENGINE. ENGINE: Type - Single Cylinder, Four-Stroke, Spark / Compression Ignition Variable Compression Ratio Engine Alternative Fuel Development for S.I. & C.I. engines. MECHANISM –In this engine, the compression ratio is to be varied by a mechanism which involves Raising or lowering the total head assembly including the valves, camshaft etc. The linear movement of the head assembly should be measureable Precisely by a Depth micrometer / Plunger Dial and this reading can be used directly to calculate compression ratio directly by means of Graph & Table provided & also by inputting the value in the software IT SHOULD BE POSSIBLE TO VARY Compression Ratio continuously FROM 5 :1 TO 22:1 Without dismantling or changing the Cylinder Head Technical Specifications: - Bore X Stroke – Approximately 87.5 mm X 110 mm Rated Capacity – 6.5 B.H.P. @ 1500 RPM when using High Speed Diesel @ CR 17.5:1 or Better Compression Ratio Adjustable from – 5:1 to 11:1 FOR SPARK IGNITION MODE & 12:1 to 22:1 FOR COMPRESSION IGNITION MODE Water Cooled engine.Fuel Delivery: - Carburettor for SI Mode & Fuel Injection Pump for CI mode Ignition timing for SI Mode 50° BTDC to 10° ATDC Starting – Thro The Dynamometer Compression is to be adjustable even when the engine is running. The flywheel MUST BE calibrated in Degrees to allow accurate measurement of ignition timing, using stroboscopic light method. An adjustment is provided so that the ignition timing, can be adjusted while the engine is running. B. DYNAMOMETER – Air Cooled AC Regenerative Dynamometer with Load Cell type Weighing Mechanism & Max Torque above 60 N-m Accuracy is < 0.25 % of Full Scale Torque of Dyno. RPM indicator is supplied with the dynamometer. C. Common Base Frame: - The engine and dynamometer are mounted on a Common Rigid Channel Frame, which can be directly mounted on the foundation block D. Cardan Shaft: A Suitable Cardan Shaft for connecting Engine to Dynamometer is provided E. Cardan Shaft Guard for protection from rotating shaft</p>	Y		1				

9	<p>Hand Held Flue Gas Analyzer For measurement O₂,CO, CO₂ (cal.), NO, SO₂, diff. pressure, Temperature and velocity measurement. With built-in printer and dataloger. Complete with 50cm or 100cm long sampling probe with 3 meter long sampling hose, filter assembly, battery charger, instruction manual datalogging software, carrying case and calibration certificate. with sensors</p> <p>Parameter Measuring range Oxygen : 0 to 21% CO : 0 to 8000 ppm NO : 0 to 5000 ppm SO₂ : 0 to 5000 ppm CO₂ : 0 to 99% calculated Temp. : 0 to 1250 oC Diff. pressure : ±200 mbar Velocity measurement : 0- 97 m/sec</p>	Y		1				
10	<p>Parallel flow/ counter flow Heat Exchanger System : Water to Water, concentric tube type Heat Exchanger: Length 1.6m (approx.). insulated with ceramic wool and cladged by aluminum foil. Outer Tube: Material Stainless steel. ID 27.5mm, OD 33.8 mm (approx) Inner Tube : Material Stainless Steel, OD 12.7mm (appx) Water Flow Measurement: Rotameters (2Nos.) one each for cold & hot fluid. Hot Water Tank: Made of Stainless steel. Insulated with ceramic fiber wool. Hot Water Circulation : Magnetic Pump Heaters : Nichrome wire heater (2Nos) Control panel comprising of Digital Temp. Controller: 0-199.90C (For Hot Water Tank) Digital Temp. Indicator: 0-199.90C, with multi-channel switch Temperature Sensors: RTD PT-100 type. With Standard make On/Off switch, Mains Indicator etc. Supplied with user manual . A good quality painted rigid MS Structure is provided to support all the parts. All the temperature should be displayed at one time on 2004 JUMBO GRAPHICAL DISPLAY with assistance of micro-controller</p>	N		1				
11	<p>Fuel supply system model The models displays the fuel supply system on board. All the components are shown separately on the board and connected with a line to show how it works</p>	N		1				
12	<p>Cooling system model The models displays the the working and components used in the cooling of an automobile engines.</p>	N		1				
13	<p>Ignition system model The models displays the the working and components used in the ignition system of an automobile</p>	N		1				

14	Lubrication system model The models displays the the working and components used in the lubricating system of an automobile engine.	N		1				
15	Fuel pump model The models displays the the working and components of fuel pump used in IC engines	N		1				
16	Fuel supply system model The models displays the fuel supply system on board. All the components are shown separately on the board and connected with a line to show how it works	N		1				
17	Fuel injector model The models displays the the working and components of fuel injector.	N		1				
18	Different types of carburetor models : The models displays the the cut section of different carburetors: Single stage single barrel, two stage single barrel or two stage two barrel	N		1				
19	Throttling and seperating calorimeter apparatus Separating Chamber :Compatible capacity made of Stainless Steel insulated with Ceramic wool with water level indicator. Throttling Chamber :Compatible capacity provided with gauge to measure in let Pressure before throttling Heat Exchanger : For Condensing steam after throttling chamber Steam Generator : Compatible capacity with digital temperature controller tocontrol the temperature inside the steam generator. Differential pressure : By manometer Measurement Steam pressure measurement: By Pressure gauge An ENGLISH instruction manual consisting of experimental procedures, block diagram etc.will be provided along with the Apparatus The whole set – up is well designed and arranged on a rigid structure painted with Paint.All the temperature should be displayed at one time on 2004 JUMBO GRAPHICAL DISPLAY with assistance of micro-controller.	N		1				
20	Stefan Boltzmann Law Apparatus Hemisphere : Dia.- 200 mm (approx.) made of Copper Jacket: Dia. 250 mm (approx.) made of Stainless Steel Test Disc Size : 20 mm Dia. x 1.5-mm thickness made of Copper Water Tank: Stainless steel 12 Ltrs. cap. Heater: Nichrome wire immersion heater. Supplied with Instruction Manual. The whole set-up is well designed and arranged on a powder-coated structure. All the temperature should be displayed at one time on 2004 JUMBO GRAPHICAL DISPLAY with assistance of micro-controller	N		1				
21	Models of different types of steam condenser The models displays the the working and components of STEAM CONDENSER	N		1				
22	Models of different types of steam nozzles The models displays the the working and components of STEAM Nozzles. (FIXED DIA, VARI=YING DIA etc.)	N		1				

23	<p>Different types of heat exchanger models The models displays the the working of HEAT EXCAHNGERS used in industry. (Shell tube type, pipe in pipe type etc.)</p>	N		1				
24	<p>Determination of Cd,Cc and Cv Orifice and Mouthpiece Apparatus : Set of Orifices: Material Acrylic (2 Nos.) Dia. 10mm and 15 mm Set of Mouthpieces: Material Acrylic (3 Nos.) Dia 10 mm (L/D = 1) Dia 10 mm (L/D = 2.5) Dia 10 mm (L/D = 4) Constant Head tank: 35 Ltrs. Pointer Gauge: To measure X-Y co-ordinates of Jet. Water Circulation: FHP Pump, Crompton make. Flow Measurement: Using Measuring Tank with Piezometer, Capacity 25 Ltrs. FLOW SENSOR with digital display along with on board calibrtrion facility with the help of buttons. Sump Tank: Capacity 70 Ltrs. Stop Watch: Electronic. Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc. Supplied with Instruction Manual with the Apparatus Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1				
25	<p>Notch Tank Apparatus Channel Test Section: Size 600 x 250 x 180 mm. Notches : Material Brass Rectangular Notch 45° V Notch 60° V Notch Pointer Gauge : With Vernier scale. Water Circulation: FHP Pump Crompton makes. Flow Measurement: Using Measuring Tank with Piezometer, Capacity 25 Ltrs. FLOW SENSOR with digital display along with on board calibrtrion facility with the help of buttons. Sump Tank: Capacity 50 Ltrs. Stop Watch: Electronic. Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc. Supplied with Instruction Manual The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1				

26	<p>Jet on Vane Appartus Target (2 Nos.) : Flat Plate and Hemispherical Cup Nozzle : Material Brass Jet Enclosure : Made of Acrylic Water Circulation : FHP Pump, Standard make Flow Measurement: Using Measuring Tank with Piezometer, Capacity 25 Ltrs. FLOW SENSOR with digital display along with on board calibrtrion facility with the help of buttons. Sump Tank: Capacity 50 Ltrs. Stop watch: Electronic. Control Panel Comprises of :Standard make On/Off Switch, Mains Indicator, etc.Supplied with Instruction Manual Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1				
27	<p>Combined Pipe Friction Measurement Appartus Pipe Test Section: (i) Dia ½", Length : 1m, Material G.I. (ii) Dia ¾", Length: 1.25m, Material G.I. Water Circulation: FHP Pump, Crompton/godrej/G.E makes. Flow Measurement: Using Measuring Tank with Piezometer, Capacity 25 Ltrs. FLOW SENSOR with digital display along with on board calibrtrion facility with the help of buttons. Sump Tank: Capacity 50 Ltrs. Stop Watch: Electronic. Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc. Supplied with Instruction Manual with the Apparatus Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1				
28	<p>Venturimeter and Orificemeter Apparatus Venturimeter: Material Clear Acrylic compatible to 1" Dia. Pipe. Orifice meter : Orifice plate made of Stainless Steel and housing made of Clear Acrylic compatible to 1" Dia. Pipe. Pitot tube set up made of stainless steel/Copper of compatible size fitted with vernier scale and housing made of clear Acrylic section compatible to 1" dia. Pipe. Water Circulation: FHP Pump, Crompton make. Flow Measurement: Using Measuring Tank with Piezometer (Capacity 25 Ltrs.) and Electronic Stop Watch FLOW SENSOR with digital display along with on board calibrtrion facility with the help of buttons. Sump Tank: Capacity 50 Ltrs. Control Panel Comprises of: Standard make On/Off Switch, Mains Indicator, etc. Supplied with Instruction Manual, Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1				

29	<p>Bernoullis Apparatus Test Section: Material Acrylic (One Piece). Piezometer Tubes: Material P.U. Tubes (7 Nos.) Water Circulation: FHP Pump, Crompton make. Flow Measurement: Using Measuring Tank with Piezometer, Capacity 25 Ltrs. FLOW SENSOR with digital display along with on board calibration facility with the help of buttons. Sump Tank: Capacity 70 Ltrs. Inlet Tank: Capacity 20 Ltrs. Stop Watch: Electronic. Control Panel Comprises of: Standard make On/Off Switch, Mains Indicator, etc. Tanks will be made of Stainless Steel. Supplied with Instruction Manual The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1			
30	<p>Metacentric Height Apparatus Pontoon: Size 300 x 300 mm (approx.) with a Horizontal Guide Bar for aliding weight and Removable Strips, Graduated Arc with Pointer with moveable hanger and set of weights. Water Tank : Size 550 x 500x 400 mm (approx.) Front Window of Tank : Made of Glass/Perspex. A set of weights is supplied with the apparatus. Supplied with Instruction Manual Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1			
31	<p>Models of different pipe joints The models displays the various type of pipe joints used in the pipelines</p>	N		1			
32	<p>Models of different types of water pumps The models displays the various type of Pumps used in water flow system. It could be centrifugal pump, magnetic pump, peristaltic pump etc</p>	N		1			
33	<p>Pelton wheel turbine Test rig Output Power: 1 kW. Discharge: 400 LPM (Approx.) Supply Head: 25 m Speed: 1000 RPM (Approx.) Nozzle: Material Stainless Steel. Spear: Material Stainless Steel. Dynamometer: Rope Brake type. Sump Tank: Capacity 200 Ltrs. Water Circulation: Centrifugal Pump, Standard make, Capacity 5 HP, Three Phase, 2800 RPM Discharge Measurement: Pitot tube with Manometer All pressure and RPM value should be displayed on 2004 JUMBO Graphical Display with assistance of microcontroller. Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1			

34	<p>Models of Piezometer and different types of monometer</p> <p>The models displays the various type of Manometer that can be put into the use for the measurement of pressure change</p>	N		1			
35	<p>Pitot tube apparatus to determine discharge</p> <p>Pitot tube: Material Copper/SS of compatible size fitted with vernies scale.</p> <p>Test Section: Material Clear Acrylic, compatible to 1" Dia. Pipe.</p> <p>Water Circulation: FHP Pump, Crompton make.</p> <p>Flow Measurement: Using Measuring Tank with Piezometer (Capacity 25 Ltrs.) and Electronic Stop Watch FLOW SENSOR with digital display along with on board calibrtrion facility with the help of buttons.</p> <p>Sump Tank: Capacity 50 Ltrs.</p> <p>Control Panel Comprises of :</p> <p>Standard make On/Off Switch, Mains Indicator, etc.</p> <p>Supplied with Instruction Manual</p> <p>Tanks will be made of Stainless Steel.</p> <p>The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1			
36	<p>Hydraulic Test Bench</p> <p>Top Tray : Size 1000 x700 x 100mm(approx)</p> <p>Water Circulation : 1 HP Pump, Crompton/Kirlo skar make.</p> <p>Flow Measurement : Using Measuring Tank, Capacity 40Ltrs.</p> <p>FLOW SENSOR with digital display along with on board calibrtrion facility with the help of buttons</p> <p>Sump Tank : Capacity100Ltrs.</p> <p>StopWatch : Electronic.</p> <p>Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc.</p> <p>Tanks and Top Tray will be made of Stainless Steel.</p> <p>Supplied with Instruction Manual</p> <p>The whole set-up is well designed and arranged on a rigid structure painted with Paint</p>	N		1			
37	<p>Kaplan turbine Test Rig</p> <p>Output Power : 1 kW.</p> <p>Discharge : 1000 LPM</p> <p>Supply Head : 5-8 M</p> <p>Normal Speed : 2000 RPM</p> <p>Dynamometer : Rope Brake type.</p> <p>Water Circulation : Centrifugal Pump, CRI/Standard Make, Capacity 5 HP, 3 Phase.</p> <p>Discharge Measurement : Pitot Tube with Manometer</p> <p>All pressure and RPM value should be displayed on 2004 JUMBO Graphical Display with assistance of microcontroller</p> <p>Sump Tank : Capacity 200 Ltrs.</p> <p>Pressure Measurement : Pressure Gauge & Vacuum Gauge</p> <p>Piping & Fittings : Pipes & fittings with flow control valves of suitable size Tanks will be made of Stainless Steel.</p> <p>The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1			

38	<p>Francis Turbine Test Rig Output Power : 1 KW Discharge : 1000 LPM (Approx.) Supply Head : 10 m (Approx.) Speed : 1000 RPM (Approx.) Runner: Having Curved Vanes. Dynamometer: Rope Brake type. Sump Tank: Capacity 200 Ltrs. Water Circulation: Centrifugal Pump, Standard Make, Capacity 5 HP Three Phase. Discharge Measurement : Pitot Tube with Manometer All pressure and RPM value should be displayed on 2004 JUMBO Graphical Display with assistance of microcontroller Control Panel Comprises of : L&T make Starter, Mains Indicator, MCB for overload protection. Supplied with Instruction Manual Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1			
39	<p>Link polygon apparatus The apparatus is provided with five linkages and connectors, having hooks to which pans are hung. These are fixed between two pulleys around which rope is run to connect to two extension type spring balances. The unit is very useful for the study of arches, abutments and piers. The wooden rectangular beam is fitted with scale. With weights.</p>	N		1			
40	<p>Simple wheel and axle The wheel and axle is a machine consisting of a wheel attached to a smaller axle so that these two parts rotate together in which a force is transferred from one to the other. A hinge or bearing supports the axle, allowing rotation. It can amplify force; a small force applied to the periphery of the large wheel can move a larger load attached to the axle</p>	N		1			
41	<p>Screw efficiency apparatus A jackscrew, or screw jack, is a type of jack that is operated by turning a leadscrew. It is commonly used to lift moderately heavy weights, such as vehicles; to raise and lower the horizontal stabilizers of aircraft; and as adjustable supports for heavy loads, such as the foundations of houses</p>	N		1			
42	<p>Automotive Lighting This apparatus displays the arrangement of lighting system used in automobiles. All the required accessories are displayed on the panel board for study</p>	N		1			
43	<p>Automotive Electrical Circuit The demonstration board which will give a complete idea of the electrical system of maruti car. In this demonstration board the actual wiring with the parts and accessories of a car had been arranged, according to the electrical circuit of the car and terminals are connected to the battery .</p>	N		1			
44	<p>Automotive Electronic circuit Electronic ignition system is a working model designed to demonstrate the students operation of a typical electronic system used in the car. The trainer consists of ignition coil, distributor, set of spark plugs and 12 V DC supply.</p>	N		1			

45	Vehicle Displays Principles systems Trainer This trainer is designed to teach students principles of Vehicle Display System and warning systems through comprehensive practical activities. The activities include instrument cluster, fuel system warning system, engine sensor warning system, automotive lighting instrumentation, passenger safety warning system, ABS failure warning system and engine failure warning system	N		1			
46	Ignition and charging system This apparatus displays the spark plug used for ignition and the related accessories. Also the Charging system is also explained in the model	N		1			
47	Digital Multimeter 3 ¼ Digit, 3100 Counts, Auto Power Off, Auto / Manual Ranging, Continuity, Diode Check, Warning for Blown Fuse & Overload Condition, Automatic Terminal Blocking System, Min / Max Value Storage, Data Hold, Digital cum Analog Bar graph Indication, Bat low Indication AC Voltage: 30 mV – 1000 V, DC Voltage: 3 V – 1000 V, AC Current: 300 uA – 10 A, DC Current: 3 mA – 10 A, Resistance: 30 Ohm – 30 MOhm, Capacitance: 30 nF – 30 uF, Frequency: 300 Hz – 100 kHz, Temperature: -200 to +850 Deg C (Pt 100/ Pt1000 input) Basic Accuracy: 0.1 %/ 0.25 % Operable with 9 V battery Holster of Soft Rubber for shock & drop protection, Electromagnetic Compatibility (EMC), IP 50 & IP 20 Protections, Supplied with set of lead, user manual, test & Calibration certificate, Rubber Holster, Carrying belt ,	N		1			
48	Tungsten Inert Gas Welding Machine(TIG). voltage 415 volt,frequency 50Hz,range output:5-35 Amp,DC max 74 volt,Adjustable clean ratio for perfect perfect aluminium welding,spot welding digital display,5 different ac waveform output synchronous mutual arc feature optimal water cooled,water cooling machine.1 power source,product type AC/DC with electrode holder,pulse TIG.,TIG torch,input current 20 Amp & output current 315 amp,cable length 3 metre.	N		1			

49	<p>CNC turning trainer machine Swing over bed: more than 110 mm Swing over carriage: more than 60 mm Distance between centers: more than 420 mm Hole through spindle: 10 mm Spindle nose thread: 3/4"-16 T.P.I . Spindle nose taper: #1 Morse Travel of crossslide: more than 100 mm Taper of tailstock spindle: #0 Morse. Protractor graduations: 0° to 45° by 5° Handwheel graduations: .001 mm Motor: 90 Volt DC with electronic speed control, input 220V/50Hz. Spindle speed range: 70-2800 RPM continuously variable by electronic eed control CNC stepper motor holding torque: 136 oz-in Rapid travel speed, X and Z: 22 inches/min The system enclosed in a metallic enclosure , openable front door, acrylic front and side cover and display panel. Having coolant system with removable collector. System Having mechanical storage system on the bottom for Computer system, Controller and for Electrical wiring. The system shall be supplied withPC, Optical Mouse, 17" TFT Monitor & Keyboard.</p>	N		1			
50	<p>Torsion Testing Machine. Max.torque capacity(Nm),Torque range(Nm)20,50,100,No. of dimension of dial 500,Test speed and direction, Clearance between grips:0-400mm Grips for square bar (mm)3-6,6-9,9-12</p>	N		1			
51	<p>Impact Testing Machine. Pendulum drop Angle:(140 degree for Charpy test)& (90 degree for Izod test),Pendulum Impact energy:300J (Charpy test) & 168J for Izod test,striking velocity of pendulum:2.45m/sec. for charpy test & 3.857 m/sec. for Izod test.,Scale graduation:2J,Max. permissible less by friction :0.50% of Impact energy.</p>	N		1			
52	<p>Pelton wheel turbine Test Rig. 5HP Glass tube (transparent)-25mm of suitable length,supply tank and die tank with needle,Flow control valve,Measuring flask and stop clock for flow measurement for conventional & recirculating type.,sump tank and recirculating tank.</p>	N		1			
53	<p>Radial Drilling Machine. Heavy Duty, Radial Drilling Machine - 25mm Cap / 8 Speed / 200mm Travel with FINE FEED Attachment Column, arm, work head & gears made out of closed grain, spindle ram is made out of alloy steel & main spindle & pinon are made of EN forged steel drilling capacity : 25 mm, column dia : 127 mm, Spindle nose : MT-3, Spindle travel : 200 mm, speed : 110-2880 RPM, Ram dia : 72 mm, drilling radius : 660 mm, drilling head motor : 1 hp (1440 rpm), lifting of arm motor : 0.5 HP, Dist. from spindle to base : 810/130, Dist. from column to spindle : 620/350, supplied with Electrical such as 1 HP 1440 RPM 3 phase Ele. Motor for Drilling 0.5 HP 1440 RPM 3 phase Ele. Motor for Lifting R/F switch 2 Nos. V-Belt 2 Nos. with Fitting... : 1 No. Box Table [250x205x205mm] , ½" Drill Chuck , ½" Arbour , 2/3" Sleeve , 6" Drill Vice</p>	N		1			

54	Impact Testing Machine. Impact Testing M/C (Charpy/Izod) Works on pendulum principle, Difference between heights of drop of pendulum before Rupture & Height of rise after Rupture of specimen is directly proportional to impact energy absorbed. Direct indication of impact energy absorbed by specimen on large dial. Confirms to BS 131 part IV-1972 & BSEN 10045-2:1993 Max. capacity: 300 Joule Min. scale graduation: 2 Joule	N		1			
55	Vicker Hardness Testing Machine Test Loads : 5,10,20,30,50 kgf Maximum test height (mm) : 230 Scale least count (mm) : 0.001 Throat Depth (mm) : 135 Machine dimensions (mm) :L460xW225xH 860 Dwell time :0-30 Sec Adjustable	N		1			
56	Pelton wheel turbine Test rig Output Power: 1 kW. Discharge: 400 LPM (Approx.) Supply Head: 25 m Speed: 1000 RPM (Approx.) Nozzle: Material Stainless Steel. Spear: Material Stainless Steel. Dynamometer: Rope Brake type. Sump Tank: Capacity 200 Ltrs. Water Circulation: Centrifugal Pump, Standard make, Capacity 5 HP, Three Phase, 2800 RPM Discharge Measurement: Pitot tube with Manometer All pressure and RPM value should be displayed on 2004 JUMBO Graphical Display with assistance of microcontroller. Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure	N		1			
57	Metal Arc Welding Machine Three phase,380 V,IGBT technology based,cooling mode: Air cooled,output current:300-400 A,invertor based,stainless steel material,Galvanised surface.	N		1			
58	Hydraulic Power Hacksaw Perfectly toothed to cut metal sheets,Continous hydraulic system for faciliating and lifting operation,optimal floor space.No. of stroke per minute:80,Electric motor:1 HP,Capacity of round bar:8",Capacity of square bar:6"Blade size:16*1.25",Stroke:5.75"size:8"	N		1			
59	CNC Wire cut EDM Wire material :Brass,Wire diameter:0.15mm,0.20mm and 0.25mm,Positional Accuracy: 0.005mm,Tolerances:.005mm,work piece thickness:upto 350mmTapper angles:A 25,acceptable file format:DXF,DWG	N		1			

60	<p>Universal Testing Machine.(40 /100 tonnes) Capacity: 400/1000 KN Mechanical Model Loading accuracy as high as $\pm 1\%$. Training roll autographic recorder supplied as standard to enable study of the behavior of materials, High reading accuracy due to large size and design of dial.Wide range of standard and special accessories, including load stabilizer. Easy change from plain to threaded and screwed specimens. Motorised loading and unloading cycle. Large effective clearance between columns enables testing of standard specimens as well as structures. Simple controls for ease of operation. Safe operation ensured by means of safety devices. Fully enclosed and protected pendulum.</p>	Y		1				
61	<p>Multi Cylinder Four Stroke Water Cooled Diesel Engine Test Rig Four cylinder, four stroke engine, vertical water cooled, self start, diesel engine. Eddy Current Dynamometer The engine coupled with Eddy Current Dynamometer with resistance loading arrangement. Digital voltmeter ,digital ammeter are provided.Digital tachometer also provided. weighing gear, control gear, a dead weight in Kg unit suitable for testing the engine at different speeds. The engine and dynamometer are directly coupled on a substantial base plate. Fuel measuring system of a fuel tank, a burette and a three way cock arrangement. Air tank with orifice and water manometer. Measurement of Heat carried Inlet outlet piping with flow control valve, water away by Cooling water meter. Thermometers are provided to measure the inlet outlet temperature of water. Common Base Frame: - The engine and dynamometer are mounted on a Common Rigid Channel Frame, which can be directly mounted on the foundation block .</p>	Y		1				

62	<p>CNC milling trainer machine Stepping Resolution: 0.003mm Mechanical repeatability : 0.01mm Spindle Speed : 1100 - 11000 RPM Travel: X = 300mm, Y = 146mm, Z = 153mm Rapid Travel of 30 in/min. Universal Standard G-Code import. Plugs directly into computer printer port. Precision Mechanics. Box way Z-axis assembly with ground steel plate and tapered brass gib. Adjustable tapered brass gib on X-axis. Ground steel sliding ways with adjustable brass gib. Hard anodized aluminum table. 1/2" (12.7mm) 20 pitch Cr-Mo lead dscrews with adjustable split bronze nuts on all axes. The system should be installed in a metallic enclosure with at least 5' height, openable front door, acrylic front and side cover and display panel.Having coolant system with removable collector. System having mechanical storage system on the bottom for Computer system, Controller and for Electrical wiring. The system supplied with PC Optical Mouse, 17" TFT Monitor & Keyboard. The complete system included with: MicroMill with Powerful 1/4 HP spindle motor, Pulley set with drive belt, 1/8" (3mm) or 3/16" (4mm) or 1/4" (6mm) collet with collet closer, Electronic Chopper Driver Unit, Custom Win 7 Mach 3 control software interface, 4th Axis Amplifier and Port Included, Input/Output Port Included, 200 oz-in. stepping motors, Printer cable, power cable etc.</p>	Y		1			
63	<p>Cooling system model The models displays the the working and components used in the cooling of an automobile engines.</p>	N		1			
64	<p>Ignition system model The models displays the the working and components used in the ignition system of an automobile</p>	N		1			
65	<p>Lubrication system model The models displays the the working and components used in the lubricating system of an automobile engine.</p>	N		1			
66	<p>Different types of heat exchanger models The models displays the the working of HEAT EXCAHNGERS used in industry. (Shell tube type, pipe in pipe type etc.)</p>	N		1			

67	<p>Heat pump Apparatus Compressor: Hermitically sealed compressor. Capacity 1/3 Ton, Condenser: Water cooled type shell and coil condenser with refrigerant inside the tube. Water flow measurement: Provided with individual rota meters and four temperature Sensor for both condenser and evaporator. Expansion Valve: Capillary Tube, Compatible Capacity. Safety Control: Overload and over current protectors for compressor and Time Delay circuit. Evaporator: Water cooled Compatible capacity. Temperature Sensor: RTD PT-100 Type. Control Panel comprises of: Digital Voltmeter: 0-300 V Digital Ammeter: 0-5 Amp. Temperature Measurement: Digital Temperature Indicator with multi-channel switch. Supplied with Instruction Manual All the accessories will be mounted on a rigid base frame made of M.S. and it will be powder coated. • All the temperature should be displayed at one time on 2004 JUMBO GRAPHICAL DISPLAY with assistance of micro-controller</p>	N		1				
68	<p>Jet on Vane Appartus Target (2 Nos.) : Flat Plate and Hemispherical Cup Nozzle : Material Brass Jet Enclosure : Made of Acrylic Water Circulation : FHP Pump, Standard make Flow Measurement: Using Measuring Tank with Piezometer, Capacity 25 Ltrs. FLOW SENSOR with digital display along with on board calibration facility with the help of buttons. Sump Tank: Capacity 50 Ltrs. Stop watch: Electronic. Control Panel Comprises of :Standard make On/Off Switch, Mains Indicator, etc. Supplied with Instruction Manual Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1				
69	<p>Combined Pipe Friction Measurement Appartus Pipe Test Section: (i) Dia ½", Length : 1m, Material G.I. (ii) Dia ¾", Length: 1.25m, Material G.I. Water Circulation: FHP Pump, Crompton/godrej/G.E makes. Flow Measurement: Using Measuring Tank with Piezometer, Capacity 25 Ltrs. FLOW SENSOR with digital display along with on board calibration facility with the help of buttons. Sump Tank: Capacity 50 Ltrs. Stop Watch: Electronic. Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc. Supplied with Instruction Manual with the Apparatus Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1				

70	<p>Bernoullis Apparatus Test Section: Material Acrylic (One Piece). Piezometer Tubes: Material P.U. Tubes (7 Nos.) Water Circulation: FHP Pump, Crompton make. Flow Measurement: Using Measuring Tank with Piezometer, Capacity 25 Ltrs. FLOW SENSOR with digital display along with on board calibration facility with the help of buttons. Sump Tank: Capacity 70 Ltrs. Inlet Tank: Capacity 20 Ltrs. Stop Watch: Electronic. Control Panel Comprises of: Standard make On/Off Switch, Mains Indicator, etc. Tanks will be made of Stainless Steel. Supplied with Instruction Manual The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1			
71	<p>Reynolds Apparatus Chemical Required: Dye (KMnO₄) - 10 gm Tube : Material Borosilicate Glass Dye vessel : Material Stainless Steel, Suitable Capacity Capillary Tube: Material Copper/Stainless Steel. Constant Head Water Tank: Capacity 40 Ltrs. Water Circulation: FHP Pump, Champion/godrej makes. Flow Measurement: Using Measuring Cylinder. FLOW SENSOR with digital display along with on board calibration facility with the help of buttons. Sump Tank: Capacity 60 Ltrs. Stop Watch: Electronic. Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc. Supplied with Instruction Manual Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1			
72	<p>Models of different pipe joints The models displays the various type of pipe joints used in the pipelines</p>	N		1			
73	<p>Models of different types of water pumps The models displays the various type of Pumps used in water flow system. It could be centrifugal pump, magnetic pump, peristaltic pump etc</p>	N		1			
74	<p>Models of Piezometer and different types of monometer The models displays the various type of Manometer that can be put into the use for the measurement of pressure change</p>	N		1			

75	<p>Pitot tube apparatus to determine discharge Pitot tube: Material Copper/SS of compatible size fitted with vernies scale. Test Section: Material Clear Acrylic, compatible to 1" Dia. Pipe. Water Circulation: FHP Pump, Crompton make. Flow Measurement: Using Measuring Tank with Piezometer (Capacity 25 Ltrs.) and Electronic Stop Watch FLOW SENSOR with digital display along with on board calibrtrion facility with the help of buttons. Sump Tank: Capacity 50 Ltrs. Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc. Supplied with Instruction Manual Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1				
76	<p>Hydraulic Test Bench Top Tray : Size 1000 x700 x 100mm(approx) Water Circulation : 1 HP Pump, Crompton/Kirlo skar make. Flow Measurement : Using Measuring Tank, Capacity 40Ltrs. FLOW SENSOR with digital display along with on board calibrtrion facility with the help of buttons Sump Tank : Capacity100Ltrs. StopWatch : Electronic. Control Panel Comprises of : Standard make On/Off Switch, Mains Indicator, etc. Tanks and Top Tray will be made of Stainless Steel. Supplied with Instruction Manual The whole set-up is well designed and arranged on a rigid structure painted with Paint</p>	N		1				
77	<p>Kaplan turbine Test Rig Output Power : 1 kW. Discharge : 1000 LPM Supply Head : 5-8 M Normal Speed : 2000 RPM Dynamometer : Rope Brake type. Water Circulation : Centrifugal Pump, CRI/Standard Make, Capacity 5 HP, 3 Phase. Discharge Measurement : Pitot Tube with Manometer All pressure and RPM value should be displayed on 2004 JUMBO Graphical Display with assistance of microcontroller Sump Tank : Capacity 200 Ltrs. Pressure Measurement : Pressure Gauge & Vacuum Gauge Piping & Fittings : Pipes & fittings with flow control valves of suitable size Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1				

78	<p>Francis Turbine Test Rig Output Power : 1 KW Discharge : 1000 LPM (Approx.) Supply Head : 10 m (Approx.) Speed : 1000 RPM (Approx.) Runner: Having Curved Vanes. Dynamometer: Rope Brake type. Sump Tank: Capacity 200 Ltrs. Water Circulation: Centrifugal Pump, Standard Make, Capacity 5 HP Three Phase. Discharge Measurement : Pitot Tube with Manometer All pressure and RPM value should be displayed on 2004 JUMBO Graphical Display with assistance of microcontroller Control Panel Comprises of : L&T make Starter, Mains Indicator, MCB for overload protection. Supplied with Instruction Manual Tanks will be made of Stainless Steel. The whole set-up is well designed and arranged in a good quality painted structure</p>	N		1			
79	<p>Simple wheel and axle The wheel and axle is a machine consisting of a wheel attached to a smaller axle so that these two parts rotate together in which a force is transferred from one to the other. A hinge or bearing supports the axle, allowing rotation. It can amplify force; a small force applied to the periphery of the large wheel can move a larger load attached to the axle</p>	N		1			
80	<p>Screw efficiency apparatus A jackscrew, or screw jack, is a type of jack that is operated by turning a leadscrew. It is commonly used to lift moderately heavy weights, such as vehicles; to raise and lower the horizontal stabilizers of aircraft; and as adjustable supports for heavy loads, such as the foundations of houses</p>	N		1			
81	<p>Automotive Lighting This apparatus displays the arrangement of lighting system used in automobiles. All the required accessories are displayed on the panel board for study</p>	N		1			
82	<p>Automotive Electrical Circuit The demonstration board which will give a complete idea of the electrical system of maruti car. In this demonstration board the actual wiring with the parts and accessories of a car had been arranged, according to the electrical circuit of the car and terminals are connected to the battery .</p>	N		1			
83	<p>Automotive Electronic circuit Electronic ignition system is a working model designed to demonstrate the students operation of a typical electronic system used in the car. The trainer consists of ignition coil, distributor, set of spark plugs and 12 V DC supply.</p>	N		1			
84	<p>Vehicle Displays Principles systems Trainer This trainer is designed to teach students principles of Vehicle Display System and warning systems through comprehensive practical activities. The activities include instrument cluster, fuel system warning system, engine sensor warning system, automotive lighting instrumentation, passenger safety warning system, ABS failure warning system and engine failure warning system</p>	N		1			

85	<p>Ignition and charging system</p> <p>This apparatus displays the spark plug used for ignition and the related accessories. Also the Charging system is also explained in the model</p>	N		1			
86	<p>Torsion Testing Machine (Digital Model)</p> <p>Max. Torque Capacity (Nm) : 100, Grip for square 5-15mm Grip for flat 5-12×40mm, Voltage 440V, Frequency 50 Hz Max.</p> <p>Capacity 100 Nm least count 0.01 Nm</p> <p>Torque Range (Nm) : 20, 50, 100</p> <p>Nos. of Division on dial : 500</p> <p>Test speed and direction : 1.5 RPM Reverse</p> <p>Clearance between grips (mm) : 0 - 450</p> <p>Grips for square bar (mm) : 3-12</p> <p>Motor (3 ph) HP : 0.5</p>	N		1			
87	<p>Rockwell cum Brinell Hardness Testing Machine (Digital)</p> <p>(Hardness tester for Metal like steel, copper, brass, aluminum etc)</p> <p>(Readings on Digital screen in HRC or HRB Scale—For Rockwell Test)</p> <p>(For Brinell Test -Manually measure the indentation diameter by using Brinell Microscope and Brinell hardness table).</p> <p>Major Loads :-Rockwell Loads :60,100,150 kgf</p> <p>Brinell Load : 187.5 , 250 kgf</p> <p>Minor load for Rockwell : 10 kgf</p> <p>Indentor : Diamond and 1/16" ball</p> <p>indentor For Rockwell test and 2.5 and 5 mm Ball Indentor for Brinell Test</p> <p>Maximum test height : 230 mm</p> <p>Depth of throat : 133 mm</p> <p>50MM Flat table and 35mm vee groove table</p> <p>HRC /HRB/ HBW Test block---1 no Each</p> <p>According to IS:1586:2000</p>	N		1			
88	<p>ROBOTIC ARM TRAINER WITH PC INTERFACE</p> <p>The robotic arm interface kit connects Robotic Arm Trainer to a personal computer,.The software for the interface permits real time control and contains a built-in interactive script writer. A user may write a script that contains up to 99 individual robotic arm functions (including pauses) into a single script file. Script files may be saved and loaded from disk just like any other standard computer file.</p> <p>Script files may be replayed automatically up to 99 times for demonstrating computer controlled automation and animatronics.</p> <p>The Robotic Arm PC Interface provide learning and experimenting with computer automation and animatronics.</p>	N		1			

89	Lathe Machine. 5.5 Feet bed length High Precision Medium Duty Double V-Belt Drive Lathe Machine complete with all standards Accessories such as Chuck Plate, Gear Set, Center Adaptor, Dead Center, Dial Indicator, Square Tool Post, Tool Post Key with HARDENED BED Length of Bed : 5 ¼ ' , Height of Centre : 212 mm, Width of Bed. : 280 mm, Spindle Hollow : 52 mm, Admit Between Centers. : 725 mm Extra accessories: Electrical such as 2 HP 1440 RPM 3 Phase Electric Motor, Switch, V-Belt & Fittings, 8" x 3 Jaw Precision True Chuck with chuck plate, 12' x 4 Jaw Dog Chuck with chuck plate, Face Plate , Follow Rest, Steady Rest	N		6			
90	Power pipe cutter CUT OFF MACHINE 14" CUT – OFF Machine with 2 HP. 3 Phase Electric Motor, V - Belt, Fitting with Abrasive Wheel – 1 No.	N		1			
91	Hand grinder Wheel Diameter (inch) 1"/ 25mm Collet Chuck Size (mm) 6 mm Power Consumption (Watt) 520 W No Load Speed (rpm) 23000 to 30000 Spindle Size 5/32"- 14	N		1			
92	Pedestal Grinding Machine 1 HP 3 Phase 2800 RPM PEDESTAL GRINDER with Grinding Wheels Size 10" x 1", 2 No. Wheel (one fine & one coarse) at each end, fitted with wheel guard, tool rest & cast iron leg	N		1			
93	Shaper Machine. 18" Heavy Duty ALL GEARED Type SHAPING MACHINE Machine Size: 18", Maximum Stroke: 20", Len of Ram: 36" Max. dist. of Table to Ram: 15" Min. dist. of table to Ram: 2" Max. vertical travel to tool slide: 4" Length & width of table top.: 18" x 12" Length & width of table slide: 30" x 11" Length of cross slide: 30" Width of Ram: 10" No of speeds: 3 Main Motor Power: 2 HP, Fitted with Vice, Motor Pulley, Handle, Ram Back Tray & Automatic Lubrication Arrangement , Accessories : Electrical such as 2 HP 3 Phase 960 RPM Electric Motor, Starter, V-Belt & Fittings, Key way cutting attachment	N		1			
94	Forge Furnance Maximum Temp.950°C, work on 220/230 v or 440 V AC, 3 phase supply	N		1			
95	Carpentry shop						
	Carpentry Vices	N		20			
	Rules	N		30			
	Straight edge	N		20			
	Try square	N		20			
	Mitre square	N		20			

Bevel square	N		20			
Combination square	N		5			
Marking Knife	N		20			
Mortise Gauge	N		20			
Cutting gauge	N		10			
Wing compass	N		5			
Trammel	N		10			
Divider	N		10			
Calliper	N		20			
Spirit level	N		20			
Plumb bob	N		5			
Rip saw	N		20			
Cross-cut saw	N		10			
Panel saw	N		10			
Tenon or back saw	N		20			
Dovetail saw	N		10			
Bow saw	N		5			
Coping saw	N		5			
Compass saw	N		5			
Pad or keyhole saw	N		5			
Firmer chisel	N		20			
beveled edge chisel	N		20			
Paring chisel	N		10			
Morise chisel	N		10			
gouges chisel	N		10			
Jack Plane	N		20			
trying Plane	N		5			
Smoothing plane	N		10			
Rebate plane	N		5			

Plough plane	N		5			
Spokeshave	N		5			
Metal jack plane	N		10			
Router	N		5			
Gilmet	N		5			
Bradawl	N		5			
Ratchet Brace	N		5			
Wheel Brace	N		5			
Drill bit	N		5			
twist bit	N		5			
Expansion bit	N		5			
Centre bit	N		5			
Forstner bit	N		5			
Countersink bit	N		5			
Warrington Hammer	N		5			
Claw Hammmer	N		5			
Ball pin Hammer	N		20			
Straight hammer	N		20			
Mallet	N		20			
Bench hold fast	N		2			
Sash cramp	N		2			
G-cramp	N		2			
Hand screw	N		2			
Rasps	N		20			
files	N		20			
Scraper	N		20			
Oil stone	N		20			
Glass paper	N		20			
Pincer	N		10			

	Cabinet Screw driver	N		2				
	Ratchet screw driver	N		2				
b	Woodworking Lathe machine Operated with 1 HP motor & mounted on table top	N		1				
97	Sheet Metal Shop							
	Different snips	N		20				
	shears	N		20				
	stacks	N		20				
	latter	N		20				
	figure pucnh	N		20				
	solid pucnh	N		20				
	hollow pucnh	N		20				
	soft hammer	N		20				
	channel	N		20				
	square bars	N		20				
	standard sheet gauges	N		20				
	Mallet	N		20				
98	Smithy shop							
	Anvil	N		8				
	Swage block	N		8				
	Hand hammer	N		10				
	Ball peen hammer	N		10				
	Straigt peen hammer	N		10				
	cross pin Hammer	N		10				
	Flat tongs	N		10				
	Rivet or ring tongs	N		10				
	Straight-lip fluted tong	N		10				
	Gad tongs	N		10				
	Flat tongs	N		10				
	Flatter	N		10				

	fuller	N		10			
	Rivet header	N		5			
	Punch	N		10			
	Hot chisel	N		10			
	size plate or bush	N		10			
	cupping tool	N		10			
	different types and different size of dice and taps	N		5			
99	Fitting Shop						
	Fitting bench vice	N		24			
	leg vice	N		4			
	pipe vice	N		4			
	hand vice	N		4			
	pin vice	N		4			
	tool makers vice	N		4			
	hand hammer	N		10			
	ball peen hammer	N		10			
	cross peen hammer	N		10			
	straight peen hammer	N		10			
	soft hammer	N		10			
	flat chisel	N		10			
	cross cut chisel	N		10			
	half round chisel	N		10			
	diamond point chisel	N		10			
	side chisel	N		10			
	flat file	N		20			
	hand file	N		10			
	square file	N		10			
	pillar file	N		10			
	round file	N		10			

	triangular file	N		10				
	half round file	N		10				
	knife edge file	N		10				
	flat single cut and double cut file	N		20				
	triangulargle cut and double cut file	N		10				
	half round file	N		10				
	care off scraper	N		10				
	surface plate	N		10				
	scriber	N		10				
	punch,	N		10				
	v block angle plate	N		5				
	try square	N		20				
	hand reamer	N		10				
	machine reamer,	N		10				
	expanding reamer	N		10				
	Different sizes Hacksaw	N		30				
100	Welding Shop							
	Apron	N		20				
	Hand gloves	N		20				
	safety goggles	N		20				
	shoes	N		10				
	welding torch	N		4				
	pressure regulator	N		2				
	spark lighter	N		20				
a	electrode for gas welding	N		100				
	electrode holder	N		2				
	cable lung	N		10				
	chipping hammer	N		20				
	earthing clamps	N		10				

	wire brush	N		20			
	Helmet	N		20			
	Sleeves	N		5			
b	Arc Welding Machine with Trasformer,cables,Electrode holder,cables,connecter etc.	N		1			
c	Gas Welding Machine.(oxyacctylene) with oxygen and acetelene cylinder ,pipes,welding torch etc.	N		1			
101	Plastic moulding shop						
	Bench moulding machine	N		1			

Authorized Signatory	
Name & Signature with Seal	
Date	

Part - B
Envelop B - Financial Bid

Annexure - 11

(To be filled in prescribed Excel format and uploaded online for Price Bid for each lab separately)

Tender No.	GWPBPL/ STORE/2019-20/2176
Date of Opening	
Name of Bidder	

ANNEXURE-11
SPECIFICATIONS OF EQUIPMENTS FOR CIVIL ENGG. LAB

S.No	REQUIRED EQUIPMENT	Specification	Pre Inspection Required Y/N	Make	REQUIRED QUANTITY in No.s	Unit Price (inclusive of Pre inspection Charges wherever applicable (Rs.))	GST in %	Total value inclusive of GST	Remarks
1	Metric Chain	IS 1492:1970 Length - 30 m and Set of 10 Arrows	N		10				
2	Gunters Chain	As per IS Code Specification	N		2				
3	Engineers Chain	As per IS Code Specification	N		2				
4	Steel Tape	IS 1492:1970 Length - 30 m in Leather Case with stainless steel/brass ring and winding device	N		2				
5	Fibre Glass Tape	30m in Leather Case with stainless steel/brass ring and winding device	N		10				
6	Invar Tape	made of alloy of steel and nickel 36%, 6mm wide, 30m long in a non-corrosive case	N		1				
7	Ranging Rods	IS 2288:1963 Length 2 m made of pipe 30mm dia painted white and black/red with iron shoes.	N		10				
8	Ranging Rods	IS 2288:1963 Length 3 m made of pipe 30mm dia painted white and black/red with iron shoes.	N		15				
9	Peg	As per IS Code Specification	N		50				
10	Off Set Rod	made of good quality teakwood 3m long	N		12				
11	Open Cross Staff	Having 4 vanes at right angle size 150mm brass and iron leg painted at bottom, 1.5m long, in a wooden box	N		6				
12	French Cross staff	Made of brass octagonal tube with teakweed pole 1.5 m long.	N		1				
13	Optical Square Prism Type	IS 7009:1973 in a brass case with 50mm dia and 15mm deep	N		6				
14	Line Ranger Prism Type	15mm diameter	N		6				
15	Prismatic Compass	IS 1957:1961 150 mm diameter (brass),30' least count, High accuracy, the graduations on the circle are engine divided for accuracy, well designed, portable, robust in construction and attractively finished with tripod stand.	N		4				
16	Surveyor Compass	As per IS Code Specification	N		4				
17	Plane Table	IS 2539:1963 Plane Table: Superior Quality sets 750mm x 600mm x 22mm,complete with metallic disc of 160mm diameter at base and with highly polished wooden Stand fitted with brass screws and washers and conforming to BIS-1764:1961, Brass Sight Vane, Plumb Bob, spirit Level 150mm long, Trough compass, 280 mm long brass U-fork, Water proof canvas cover	N		4				

18	Alidade Simple	As per IS Code Specification	N		4				
19	Levelling Staff	Length 4m - IS 1779:1961	N		4				
		Aluminum , telescopic in canvas cover 5mm least count, alternative black and white painted, every meter in red							
20	Transit Vernier Theodolite	IS 2988:1965	N		1				
		Telescopic Length 150 to 210mm							
		Magnification 25 to 30x							
		Resolving Power 1.3mm							
		Minimum focusing distance 1.5m							
		stadia multiplication constant 100							
		addition constant 100 Image - Erect Accuracy - 5mm/Km							
		sensitivity of vertical circle - 20 second/ 2 mm							
		Horizontal circle - 100 to 125 mm Graduation 20 min							
		Vernier - 20 seconds Vertical circle 100 to 125 mm Graduation 20 min with Optical Plummet With telescopic level and flate level applied with all standard accessories.							
21	Planimeter	IS 7543 Digital	N		1				
		LCD with 8-digit figures, 10 symbols. Symbol : Batt-E, SCALE, MEMO, HOLD, cm2, m2, km2, in2, ft2, acre. Converting : Unit and scale value. Measuring Rang : Maxium vertical width: 325 mm Horizontal roller rotating length: 30 m. Accuracy : Witin $\pm 0.2\%$ (within $\pm 2/1000$ pulses) Power Supply : Built-in Storage Battery (rechargeable through AC adapter). AC 100V, 120V, 220V and 240V, (using the supplied AC adapter) (provided with auto power-off function) Operating Duration : Approx. 30 hours of continuous operation. Battery Charging : Approx. 15 hours. MainUnit Weight : 750 g. Accessories : Supplied AC adapter and plastic case							
22	Tacheometer	IS 2988:1965	N		2				
		Telescopic Length 150 to 210mm							
		Magnification 25 to 30x							
		Resolving Power 1.3mm							
		Minimum focusing distance 1.5m							
		stadia multiplication constant 100							
		addition constant 100							
		Image - Erect							
		Accuracy - 5mm/Km							
		sensitivity of vertical circle - 20 second/ 2 mm							
		Horizontal circle - 100 to 125 mm							
		Graduation 20 min							
		Vernier - 20 seconds							
		Vertical circle 100 to 125 mm							
Graduation 20 min									
Vernier - 20 seconds									
with Optical Plummet									
With telescopic level and flate level applied with all standard accessories.									
23	Compression Testing Machine (200 Tonnes)	With Electrical Cum Manual operated pumping unit	N		1				
		Conforming to specifications and tolerance in accordance to I.S. 516 for determination compressive strength on cube mould							
		up to 15cm, also special size of platens is provided to test standard brick specimen.							

24	Vicat Apparatus	IS:5513- 1976 Shall consists of a metallic frame bearing a movable rod with cap at one end a vicatmould 70mm dia. at the base, 50mm dia. at the top and 40mm high and with a glass base plate, consistency plunger, initial and final needles in a nice case.	N		4				
25	Slump Cone Apparatus	IS 1199-1959 and IS 7320 Tamping rod 16mm dia, 600 mm length The mould for the test specimen shall be in the form of the frustum of a cone having the following internal dimensions: Dimensions- Bottom diameter: 200 mm Top diameter: 100 mm Height: 300 mm The mould shall be constructed of metal (brass or aluminium shall not be used) of at least 1.6 mm (or 16 BG) thickness and the top and bottom shall be open and at right angles to the axis of the cone. The mould shall have a smooth internal surface. It shall be provided with suitable foot pieces and also handles to facilitate lifting it from the moulded concrete test specimen in a vertical direction as required by the test. The tamping rod shall be of steel or other suitable material, 16 mm in diameter, 600 mm long and rounded at one end.	N		4				
26	Compaction Factor Apparatus	IS 1199 and IS 5515 Compaction Factor Apparatus for determination of workability of concrete mixes as per IS 1199: 1959. The essential dimensions of the hoppers and mould and distances between them are as follows Upper hopper, A Top internal diameter: 254 mm Bottom internal diameter: 127 mm Internal height: 279 mm Lower hopper, B Top internal diameter: 229 mm Bottom internal diameter: 127 mm Internal height 229 mm Cylinder, C Internal diameter: 152 mm Internal height: 305 mm Distance between bottom of upper hopper and top of lower hopper: 203 mm Distance between bottom of lower hopper and top of cylinder: 203 mm The hopper and cylinder shall be of rigid construction, true to shape and smooth inside. They shall preferably be made of cast brass or bronze, but stout sheet brass or steel may also be considered satisfactory provided the inside surfaces of the joints are smooth and flush. The lower ends of the hoppers shall be closed with tightly fitting hinged trap-doors having quick release catches. Metal plate 3 mm thick is suitable for the doors. The frame in which the hoppers and cylinder are mounted shall be of rigid construction and shall be firmly located. The cylinder and hoppers shall be easily detachable from the frame.	N		1				
27	Rebound Hammer Apparatus	Rebound Hammer as per IS 13311 (Part II) : 1992 with calibration certificate. It consists of a spring controlled mass that slides on a plunger within a tubular housing and a testing anvil.	N		1				
28	Vibration Table	IS 2514	N		1				
29	Concrete Mixer	Motorised Concrete Mixer (drum type)for Laboratory(Electrically operated): The mixer shall consist of a steel vessel of 50-60 litres, mounted on a frame. The vessel can be tilted to any angle by a handle. This facilitates mixing and discharge. Blades are provided inside the vessel to mix the material thoroughly. The drum, handle and motor etc. shall be mounted on a steel frame. This model is provided with two large wheels for carting away. Supplied complete, with motor of 1 HP along with lead wire. Suitable for operation on 220V, 50Hz, Single Phase, AC supply.	N		1				
30	Cube Moulds	Cast iron mould for 150mm cube with ISI Certification mark as perIS : 10086-1982	N		27				
31	Cylindrical Moulds	Cast iron cylindrical mould with diameter 100mm and length 300mm with ISI certification mark as per IS : 10086-1982 with tamping bar 16 mm dia, 600 mm long.	N		18				
32	Beam Moulds	As Per Relevant IS Specifications	N		9				
33	Steel mould for 70.6mm cube	IS : 10080-1982	N		27				

34	Mason Tool Kit	Plumb bob with striker 3/4 lbs conical, 2 iron floor size 40mm and 10 mm , Mosons hammer 11/2 lbs with brick cutting deivces on one sides; 4 chisel pointed, 4 chisel knife edge, 4 trowel of size 200 mm, 150mm, 100, 50mm, two wooden floor size 1m x 10 cm, and 45 cm x 10 cm	N		2				
35	Plumber's Kit	Pipe Wrench 25 cm, 35 cm, 45 cm, 60 cm, pipe vice portable, Dye 1cm to 2.5 cm, 1.5 cm to 5 cm, Hack Saw, Hammer 1/2 kg, Chiesel knife edge, plair, notch plair, Forceps, cutters	N		1				
36	Aggregate Impact Test Apparatus	IS 2386 (PART-IV)	N		1				
		Shall be consisting of a base weighing between 22-30 kg with a lower surface of not less than 300 mm and support columns to form a rigid frame work around the quick re lease trigger mechanism to ensure an effective free fall of the hammer during test. The free fall shall be adjusted through 380 + 5.0mm. The hammer should be provided with a locking arrangement. A metal top (Hammer) weighing 13.5 to 14.0 kg. The lower end in cylindrical shape, 100mm in diameter and 5cm long with a 2mm chamber at the lower edge and case hardened. Shall be complete with a cylindrical cup, 102mm dia x 50mm depth, one measure 75mm dia x 50mm deep and tamping rod of circular cross section 10mm in diameter and 230mm long rounded at one end.							
37	Flackiness and Elongation Apparatus/ Thickness and Length gauge	IS: 2386 (Part I)- 1963	N		2				
38	Le-Chatelier Apparatus	IS 4031	N		2				
39	Bulk Density Buckets	20 lts, 10 lts and 1 lts	N		1				
40	Briquette Mould	IS 269/4031	N		12				
		For making cement briquette for tensile strnght on cement complete with base plate with (a) single gang (b) three gang							
41	Sieve Sets for Coarse Aggregates	80mm, 40mm, 20mm, 16mm, 12.5mm, 10mm, 4.75mm, 2.36mm, 1.18mm and Pan and Lid	N		3				
42	Sieve Sets for Fine Aggregates	4.75mm, 2.36mm, 1.18mm, 600 μ , 300 μ , 150 μ , 75 μ and Pan and Lid	N		3				
43	Sieve Shaker	Motorised Sieve shaker with Built-in-digital timer for 20cm dia sieves Carries up to 7 sieves of 150 mm. or 200 mm. diameter. The shaker is driven by a ¼ h.p motor	N		1				
44	Electronic Weighing Machine	Electronic weighing machine (Digital) capacity -- 10kg L.C. – 0.1gm with Tare facility, In-built Battery Backup and with calibration certificate	N		1				
45	Electronic Weighing Machine	Electronic Weighing Balance Capacity - 5 kg, least count 0.1 gms	N		1				
46	Electronic Weighing Machine	Electronic weighing machine (Digital) capacity -- 1kg L.C. – 0.01gm with Tare facility, In-built Battery Backup and with calibration certificate	N		1				
47	Electronic Weighing Machine	Platform type electronic weighing machine (Digital) capacity -- 100kg L.C. – 10gm (0.01kg) Platform size – 400 x 400 mm with Tare facility, In-built Battery Backup and with calibration certificate	N		1				
48	GI Tray	As Per Relevant IS Specifications	N		6				

49	Electric hot air oven	Temperature range 40°C to 300°C. fitted with motorized air circulation system & inner chamber of stainless steel with digital controller cum indicator. Inner chamber size 600mmX600mmX900mm.	N		1												
50	Air Permeability Testing Apparatus for Cement	IS: 5516- 1996 The apparatus shall comprise of a permeability Cell "U" tube manometer with stop cock mounted a sunmica wooden stand, perforated metal disc, plunger, Rubber, Stopper, Rubber tube with rubber bulb. (with ISI certification mark).	N		1												
51	LOS ANGELES ABRASION TESTING MACHINE	IS: 10070-1982)	Y		1												
		The machine should comprise the following :-															
		(i) A hollow steel cylinder mounted on a sturdy frame on ball bearings capable of rotating about its axis in a horizontal position.															
		(ii) A detachable shelf fitted inside the cylinder extends throughout the inside the length of the drum catches the abrasive charge & does not allow it to fall on cover.															
		(iii) A motor (standard make/Crompton Greeve) with reduction gear which runs the drum at 30-33 rpm.															
		(iv) A tray.															
		(v) A revolution counter.															
		(vi) Abrasive charge consisting of 12 steel ball approximately 48 mm dia and each weighing between 390 and 445 g.															
		1. Water Level indicating gauge glass with stainless steel guard															
		2. Pressure Gauge															
3. Electrical Control Box, fitted with toggle switch, indicating Neon lamps and steam release valve	N																
4. Foot Paddle lifting device.																	
5. Other Accessories:-																	
a. Automatic Pressure Control Switch b. Automatic Water Cut-off Device c. Temperature Indicator (Dial Type) d. Mechanical Timer with Alarm System.																	
IS: 9376, IS:2386 (part IV)									N		1						
Shall consists of M.S. Cylindrical container 150 mm plus minus 0.5 mm dia x 130mm to 140 mm high with base plate 200 to 230 mm/sqr x 6 mm thick. A plunger of 148±0.5 mm dia x 100 to 115 mm high. Shall be supplied complete with tamping rod ; 16 mm dia x 600 mm long, one end rounded and all other necessary accessories.																	
53									Standard Penetration Test Apparatus For Bitumen	As per IS 1203 -1978	N		1				
54									Ductility Test Apparatus For Bitumen	As Per IS 1208-1978	N		1				
55									Softening Point Test Apparatus	As Per IS 1205-1978	N		1				
56									Specific Gravity Test	As Per IS 1202-1978	N		1				
57	Viscosity Test(Ring & Ball Test)	As Per IS 1206-1978	N		1												
58	Flash and Fire Point Test	As Per IS 1209-1978	N		1												
59	Float Test	As Per IS 1210-1978	N		1												
60	Determination of Water Content of Bitumen	As Per IS 1211-1978	N		1												
61	Electric Oven with Thermostatic Control	Temp range:- ambient to 300 OC (accuracy ±0.5) inner chamber is made of Stainless Steel.	N		1												
62	Weighing Balance Electronic	Capacity - 10kg Least Count - 1 gms	N		1												

63	Weighing Balance Electronic	Capacity - 5 kg Least Count - 0.1 gms	N		1				
64	Weighing Balance Electronic	Capacity - 500 gms Least Count - 0.001 gms	N		1				
65	Pycnometer	Pycnometer as per IS: 2386 (Part III)- 1963 with Brass Cone. Capacity 1000ml having a metal conical screw top with a 6-mm diameter hole at its apex.	N		5				
66	Density Bottle	50ml, 25ml, 10ml	N		3				
67	Sand Replacement method Apparatus	IS 2270 part 28	N		2				
		Small Sand pouring cylinder 3lt cap. Fitted with funnel and shutter. Cylindrical calibrating container internal depth 150mm with flange and internal diameter 100mm. 2 Metal tray 300mm x 300mm and 40mm deep one with 100mm hole in the centre and another without hole in the centre. Perplex plate 450mm square and 9mm thick. Scrapper, Digger.							
68	Cylindrical Core Cutter Field Density Kit	IS 2270 part 29	N		2				
		Cylindrical Core Cutter of steel 100mm internal dia and 127.3mm long with bevelled edge. Steel dolly 25 mm high and 100mm diameter with rib, rammer with steel rod including a spare cylindrical core cutter 100mm dia x 175 mm long							
69	Liquid Limit Apparatus Hand Operated	IS 2720 part V	N		2				
		complete with Cassagrande and ASTM tools gauge block, spatula, bowl and counter.							
70	Plastic Limit Apparatus	IS 2720 part 5	N		2				
		Consisting of brass rod of 3m dia 150 mm long. Glass palte 200 x 150 x 3 mm thick. Porcelain evaporating dish 120mm dia. Flexible spatula with 80mm long 20mm wide blade. Moisture cans.							
71	Shrinkage Limit Set	IS 2720 part 6	N		2				
		75mm square and 3m thick plate with three metal prongs. 75mm square and 3 mm thick perspex plain table. Three stainless steel shrinkage dish of 45 mm internal dia and 15 mm deep. Glass cup with ground edge of 50mm to 55 mm dia and 25 mm deep. Glass cylinder graduated 25m. x 0.5 ml. Spatual flexible blade size 80mm long 20mm wide. Mercury 500 gms.							
72	Sieve Sets for Coarse Aggregates	Standard Test Sieves : 300 mm dia, Spun Brass Frames (Size 100mm, 80mm, 63mm, 40mm, 25mm, 20mm, 12.5mm, 4.75mm, 6.3mm)& Lid & Pan	N		2				
73	Sieve Sets for Fine Aggregates	Standard Test Sieves : 200 mm dia, Spun Brass Frames (Size 4.75mm, 2.36mm, 1.18mm, 600 micron, 300mic, 150mic, 75mic & lid & pan)	N		2				
74	Sieve Shaker	Motorised Sieve shaker with Built-in-digital timer for 20cm dia sieves Carries up to 7 sieves of 150 mm. or 200 mm. diameter. The shaker is driven by a ¼ h.p motor	N		1				
75	Universal Extractor Frame Hand Operated	As Per relevant IS Code Specifications	N		1				
76	Sample Extractor for 38mm dia Hand Operated	As Per relevant IS Code Specifications	N		2				
77	Sampling Auger Outfit Blade Type (Post Hole Type)	As Per relevant IS Code Specifications	N		2				
78	Sampling Auger Outfit Screw Type	As Per relevant IS Code Specifications	N		2				

79	Proctor Compaction mould and Rammers	IS 2720 part 7 and part 8	N		1				
80	Laboratory CBR Test Machine	As per IS 2720 part (16) Consisting of motorized Load frame capacity 5000kfg with three rates of travel of 1.25, 1.5 and 2.5mm/min Mould 150mm internal dia x 175mm height, Perforated base plate Power Supply 220/240 V 50Hz single Phasefor mould, extension collar 150mm dia x 50mm height. Penetration piston face 50mm dia with adjustable bracket for penetration dial. spacer discs - 148mm dia x 47.7 m high with deatchable handle. Slotted metal weight 2.5 kgg with 147mm dia 53mm slot, Annulled metal weight 2.5kgg with 147mm dia and 53mm dial central hole. Perforated swell plate 148mm dia with adjustable stem and lock nut, Metal tripod for dial gauge cutting collar proving ring of 1000kg capacity with dial gauge 0.1mm x 25mm 2 off, Rammers light and heavy 2.6kg x 310mm drop, 4.89 kg x 450mm drop	N		1				
81	Direct Shear Test Apparatus	IS 2720 part 13	N		1				
82	Triaxial Shear Test Apparatus with electronic instrumentation system	IS 2720 part 12	N		1				
83	Proving Ring with Calibration Charts	As Per relevant IS Code Specifications	N		1				
84	Dial gauges	As Per relevant IS Code Specifications	N		10				
85	Glass Ware IS: 2386 (Part III)- 1963	Beaker - 25ml, 50ml, 100ml, 250ml, 500ml	N		6	each			
86	Graduated Cylinder	Graduated Cylinder with pour out - 25ml, 50ml, 100ml, 250ml, 500ml	N						
87	Volumetric Flasks	Volumetric Flasks with stopper - 100ml, 250ml, 500ml	N						
88	Desiccatory	Desiccator non vaccum type with 250mm dia L.S.	N						
89	Porcelain Ware	Evaporating dishes with spout 75mm, 100mm, 125mm, 150mm dia	N						
90	Colmcilles	30ml and 50ml	N						
91	Mortar and Pestle	150mm dia and 100mm dia	N						
92	Moisture Cans	Spatula, Brush, duper wash bottle	N						
93	Sundry Tools	Scoop, spades, ropes, trays, trolleys, spirit levels, wheel barrow, tongs	N						
94	Sample container Non - Corrodible Air tight	I)5 cm dia, 3cm height II)10 cm dia, 5cm height III)15 cm dia, 6.5cm height	N		10				
95	Spatula	IS 269-1958	N		6				
96	Palette Knives	As Per relevant IS Code Specifications	N		6				
97	Straight Edge	As Per relevant IS Code Specifications	N		6				
98	Ground Glass Plate	20cm x 15cm x 5mm	N		2				
99	Square Trowel	As Per relevant IS Code Specifications	N		1				
100	GI Trays	As Per relevant IS Code Specifications	N		6				
101	Split Spoon Sampler	As Per relevant IS Code Specifications	N		2				
102	Grain Size Apparatus (Pipetter Method)	As Per relevant IS Code Specifications	N		1				
103	Standard Proctor Compaction Apparatus	As Per relevant IS Code Specifications	N		2				

104	Modified Proctor Apparatus	As Per relevant IS Code Specifications	N		2				
105	Vane Shear Apparatus	As Per relevant IS Code Specifications	N		4				
106	Digital pH meter	Range: 0 to 14 pH, resolution 0.01 pH. (Auto Temp. Compensation). 2 point calibration. Millivolt Range - 0 to 1999 MV. Repeatability - +0.01 pH 1 digit + 1 MV + 1 digit. Temperature 0 to 100 degree Celcius. Compensation - LCD display with Automatic polarity indication. Power Supply - 220/240V, 50Hz Single Phase.	N		2				
107	Turbidity Meter	Range - 0 to 1000 NTU, Accuracy : +3% of FSD in 0-1000 NTU, Detector : Variable Range tube , Calibration : With formazine standard solution, Power Supply 220V, 50Hz, single phase, AC 220 to 240 V	N		2				
108	Photochem Colorimeter	Complete with built 1-5 filter disc with glass filter (having peak transmission at 420mm, 490, 540, 590, 650mm), test tube holder one dozen matched and marked test tube, dust cover, spare lamp with digital display of percentage transmission and concentration	N		1				
109	Digital Type Chloroscope for Residual Chlorine	Range 0 to 10mg/lit, Resolution - 0.1 mg/lit, Electrode - Membrane type pole Graphics, Power - Dry Batteries	N		1				
110	Digital DO meter for Sewage Sample	Digital Display type, Range 0 to 20 mg/lit. Automatic temp. compensation Temp, range 0 to 45 C	N		1				
111	BOD Incubator for Sewage Sample	Electronic digital read out temp range -50C to +50C with accuracy 10C, Thermostatic controlled +50C. Capacity 285lt with built in thermometer and three compartment with usual accessories	N		1				
112	Bacteriological Colony Counter	With 110mm Magnifying glass and lighting arrangement	N		1				
113	Bacteriological Incubator (Hot Count)	For variable temperature control 30C to 70C for MPN Count and plate count Chamber. Size 4000 x 380 x 700mm double door.	N		1				
114	Jar Test Flocculator	Flocculator Alum Jar Test Apparatus variable speed from 10 to 150 RPM, with paddles and special light arrangement at bottom., Cap:- 6 stirrer of 1 Ltr. Power supply 230V, 50Hz AC	N		2				
115	Centrifuge	Maximum Speed : 3500 RPM, No of Tube - 4, Tubes size - 15ml, Power Supply - 230V., 50Hz AC	N		1				
116	Mechanical Stirrer	Capacity 6-8 lt, Variable speed from 50RPM to 300 RPM, Power supply 230V., 50Hz., AC	N		1				
117	Water Analysis Kit	Total Dissolved Solids, Niterates, Chlorides/sulphates, Carbonates, pH, Bacteriological test, Comprises of Chloride table, Nitrate tablet, tubes, Theromoter Beaker, funnel and TDS meter	N		1				
118	Hot Air Oven	Temp range:- ambient to 300 0C (accuracy ±0.5) inner chamber is made of Stainless Steel. Size 355 x 355 x 355 mm with 2 Nos Shelves and air circulating Fan.	N		1				
119	Water Sampler	Shallow and deep well water samplers	N		3				
120	Water Distillation Apparatus	As Per Relevant IS Specification	N		1				
121	High Volume Air Sampler Attachement for Gases	As Per Relevant IS Specification	N		1				
122	Glass Ware of Different Size	Beaker, Watch Glass, Spatula, Crucible, reservoir Bottle, Burette, Pipette, Wire Gauge, Reagent Bottle, Conical Flask, TBFB 24, Condenser Vertical Measuring Cylinder, Crucible adopter, Volumetric Flask, Burette Stand, Bunsen Burner, Wash Bottle, Test Tube, Test Tube STand, Pipette Stand, Thermometer, Separating funnel, Petri Dish	N		6				

123	Digital Electronic Balance	Capacity: 200gm. Accuracy : 0.1 mg. Fully automatic inter calibration	N		2				
124	B.O.D Incubator with shaker.	Temp range: 5°C to 70°C + 0.5°C & with shaker speed controller and air circulation fan for uniform Temp. Shaker platform to hold 16 Flasks of 250 ml.	N		1				
125	Hot Plate	8" dia with energy regulator and an Indicating Lamp. Works on 230 volts AC	N		1				

Authorized Signatory Name & Signature with Seal	
Date	

Part - B
Envelop B - Financial Bid

Annexure - 12

(To be filled in prescribed Excel format and uploaded online for Price Bid for each lab separately)

Tender No.	GWPBPL/ STORE/2019-20/2176
Date of Opening	
Name of Bidder	

ANNEXURE-12
SPECIFICATIONS OF EQUIPMENTS FOR BASIC SCIENCE LAB

S.No	Specification	Pre Inspection Required Y/N	Make	REQUIRED QUANTITY in No.s	Unit Price (inclusive of Pre inspection Charges)	GST in %	Total value inclusive of GST	Remarks
1	Screw gauge (Micrometer) : Range: 25mm , Least Count : 0.01mm	N		10				
2	Vernier calliper : Range : 150mm , Least Count : 0.01 mm	N		10				
3	Glass Slab	N		10				
4	Prism	N		10				
5	Convex lens	N		10				
6	Young Modulus kit Determine Youngs moduluss, modulus of rigidity and poissons ratio of the material of a given wire by Searles dynamical method. it consists of: Identical Bar - 2 Nos, Stop Watch, Screw Gauge, Vernier Calipers, Candle & Match Box, Connecting Wire	N		1				
7	Photo Electric cell Plancks Constant Apparatus Objective : To plot Reverse V-I Characteristics of a Vacuum Photocell using different filters. Specifications : DC regulated Power Supply of plancks constant 0-1 VDC. Photo cell mounted in wooden box, having window for injecting light & also to fit the different filters., One wooden plank with 1/2 meter scale, light source with 100W lamp & set of filters	N		10				

	Photo Cell Characteristics Apparatus Objective : To plot forward Characteristics of a Selenium Photocell & to verify Inverse Square Law of light. Specifications : Selenium Photo cell (ME 515) mounted in metal box, light source with 60W lamp (L 527), Photo Cell Kit (P 527) with DC microammeter of 1000 μ A & DC Millivoltmeter of 500 mV mounted behind the panel, connections of Supplies, Meters are brought out on front panel	N					
8	Voltmeter 1) Moving Coil Portable, DC, Voltmeter Single Range:0- 100 V, housed in bakelite case with knife edge pointer and anti parallax mirror scale of 140 mm length centre pole magnet movement Accuracy : CLASS 1.0 As Per ISS 1248/83 Sensitivity : 1000 Ohms/V 2) Moving Iron Portable, AC, Voltmeter Single Range: 0- 500 V Portable housed in bakelite Case, with Pointer & Anti Parallax Mirror Scale of 140 mm, Accuracy : CLASS 1.0 As Per ISS 1248/83	N		10			
	Ammeter A)Moving Coil Portable, DC, Ammeter Single Range:0-5 Amp (With Internal Shunt), Housed in bakelite case with knife edge pointer and anti parallax mirror scale of 140 mm length centre pole magnet movement, Accuracy : CLASS 1.0 As Per ISS 1248/83 B) Moving Iron Portable, AC , Single Range: 0- Ammeter 10A Principle : Portable Moving A/C Portable housed in bakelite Case, with Pointer & Anti Parallax Mirror Scale of 140 mm Accuracy : CLASS 1.0 As Per ISS 1248/83	N		10			
9	Capillary tube experimental kit	N		1			
10	Concave lens	N		10			
11	Searls apparatus kit Coefficient of Thermal Conductivity by Searl's Method Ability to practically identify thermal steady state. To control temperature with constant pressure head. To determine thermal conductivity of good conductor	N		1			
12	Capillary rise apparatus kit	N		1			
13	Boyle's Law apparatus Suitable fordemonstration in different pressure ranges , comprises of a thick walled, wide-bore glass tube mounted vertically in front of a scale graduated 0 to 65cm ³ , with closed end of the tube at the top and open bottom end.	N		1			

14	<p>STOKE'S LAW VERIFICATION APPARATUS</p> <p>Graduated Transparent plastic glass jar 1m tall and 37mm dia, Teflon balls of different diameters between 6mm to 20mm at least 2 dozen, lubricating oil</p>	N		1			
15	<p>Hot air Oven</p> <p>Temperature controlled by Digital Temp. Controller-cum-Indicator from 50 °C to 250 °C. Beaded heating elements are placed in ribs at the bottom and sides. Double walled, inside made of Aluminum or Stainless Steel & outside mild steel sheet finished with attractive powder coating with wire mesh nickel plated trays. Hinged insulated door fitted with heat resistant gasket. Air circulating fan is provided to obtain uniform temp. in the working space, with two pilot lamps, on off switch, to work on 220/230 Volts A.C., Size: 300 x 300 x 300 mm, Trays: 2</p>	N		2			
16	<p>Digital Electronic Balance for Personal Weighing</p> <p>Digital Personal Scale</p> <p>Capacity - 180kg</p> <p>Pan Size - 300 mm * 300 mm</p> <p>With White Backlight</p>	N		6			
17	<p>Bomb Calorimeter</p> <p>Bomb Calorimeter should be as per British Standard Institution BS 1016 & Method for determination of heat of combustion of Organic matter and the calorific value & sulphur content of solid & liquid fuel.</p> <p>TESTING OF BOMB : In accordance with the requirement of the Institute of Petroleum, a works certificate is issued with each Bomb. This certificate gives the results of hydraulic testing under a pressure of 300 atmospheres (4400 psi) maintained for a period of ten minutes without any sign of leakage.</p> <p>CALORIMETER VESSEL : The vessel is made up of copper and is Chromium plated or S.S. It includes a Bomb support.</p> <p>WATERJACKET : The outer container of Jacket is made up of Stainless Steel. The top is closed by the bakelite cover called combined lid.</p> <p>OFFSET STIRRER : The stirring mechanism supplied gives sufficient turbulence for effective stirring. It consists of an impeller stirrer driven at a constant speed of approximately 800 rpm.</p> <p>ELECTRONIC FIRING UNIT WITH DIGITAL BECKMANN THERMOMETER</p> <p>The unit incorporates a digital Beckmann thermometer for the precise measurement of the rise in temperature and electronic circuitry that provides the electrical means for firing the samples.</p> <p>CRUCIBLE : A Stainless Steel crucible of B ml. capacity which fits in the standard support ring provided with the outfit.</p> <p>Oxygen Cylinder & Regulator, Capacity 7 cuft for Bomb Calorimeter</p>	N		1			

18	<p>Stop watch Resolution 1/100 of a second, Calendar displays day, month and date. alarm setting 12 or 24 hour clock format. Mode : start, stop & reset Complete with built in battery & neckstrap.</p>	N		10				
19	<p>Sand Bath Size : 250 x 250 x 100 mm (LxWxH) MOC : Tank Thick SS304 sheet and Outer MS with powder coating Heater : 1250 Watts Control : Digital PID Temp controller with PT100 sensor Temp Range : 50 Deg to 600 Deg C Supply : 220 V AC , 50 Hz, Single Phase</p>	N		36				
	<p>Redwood viscometer -I Electric Heated Model with Digital temperature controller cum indicator Confirming to requirement of IP70. Redwood Viscometers No. I for liquids having Redwood Flow 20 seconds to 2000 Seconds, Suitable to operate at 220 Volts 50 Hz AC mains Or gas heating arrangement with silver plated oil cup with precision stainless steel jet, ball valve, cover, thermometer clip, stirrer and suitable stand with levelling screws. The sample required to be tested, is to fill in to the required level as indicated by the gauge in a cup having a Stainless Steel jet fixed in the bottom.</p>	N		5				
20	<p>Redwood viscometer -II Electric Heated Model with Digital temperature controller cum indicator Confirming to requirement of IP70. Redwood Viscometers No. II exceeds 2000 seconds., Suitable to operate at 220 Volts 50 Hz AC mains Or gas heating arrangement with silver plated oil cup with precision stainless steel jet, ball valve, cover, thermometer clip, stirrer and suitable stand with levelling screws. The sample required to be tested, is to fill in to the required level as indicated by the gauge in a cup having a Stainless Steel jet fixed in the bottom.</p>	N						
	<p>Pensky- Marten's Flask print appartus Pensky Marten Flash Point Apparatus with Oil test Jet device electric heated with separate energy regulator control box This is widely used for determination of closed cup Flash Point of Fuel Oil, cut back asphalts, other viscous material and suspension of solids having a flash point about 49°C(120°F)., according to IP 34, ASTM-D-93-58T, IS-1448(P:I) 1960(P:21) and IS 1209/1958 method B. Supplied with Thermometers & temperature Controller cum Indicator</p>	N		5				

21	<p>Digital Spectrophotometer Range 190 to 1000 nm with facility for automatic concentration, SPECTRAL BANDWIDTH : 2 nm, ACCURACY : +/- 0.5 nm, REPEATABILITY : +/- 0.3 nm Motorised Microcontroller based wave length selection,4 digit LED display for wavelength, 3½ digit LED data display. It has 4 position sample holder with position selector control for 10mm path length cuvettes.A set of 2 quartz cuvettes is provided. PHOTOMETRIC RANGE : % T : 0 to 100% Abs. : 0 to 1.999 Conc. : 0 to 1999, ACCURACY : 0.005 Abs at 1.0 Abs, 0.010 Abs at 1.5 Abs, LIGHT SOURCES : a) Tungsten - Halogen Lamp (b) Deuterium Lamp, DETECTOR : Wide range silicon photodiode, SAMPLE HOLDER : 4 Position sample holder, POWER : 230V 10% 50Hz, AC... supplied with Quartz Cuvettes : Set of 2 (10mm pathlength), Dust Cover, Disposable Cuvettes- 4 no, Main Lead & user manual</p>	N		2				
22	<p>Digital sound level meter AC Analog Output , Weighting (A&C), Response Time (Fast/Slow), Record Max/Min values over time Display Counts 2000 count LCD , Sound Range (dB): 40 to 130dB Basic Accuracy: ±2dB, with 0.1dB resolution Condenser Microphone: 0.5" (12.7mm) , Supplied with Batteries, microphone windscreen & user manual</p>	N		4				
23	<p>Sound level meter with data Logger Meets ANSI & IEC 61672-1 TYPE 2 standard, Datalogging capability up to 20,000 records, Capture up to 10 readings/sec when connected to a PC, Records readings with real date and time stamp Min/Max and Data Hold functions, Heavy Duty rugged double molded housing, USB port includes software, Auto power off with disable capability Weighting: A and C, Response Time: Fast/Slow AC/DC Analog Output, Range: 30 to 130Db Basic Accuracy: ±1.4dB PC Interface: USB, Includes Windows® compatible software, USB cable, wind cover, tripod, hard carrying case, AC adaptor, and 9V battery</p>	N		2				

24	<p>Sound level Calibrator With durable die-cast, aluminum housing Features: Calibrates and verifies Sound Level Meter operation, For use on Sound Level Meters with 0.5" or 1.0" microphones, Total Harmonic Distortion (THD) <2% at 94dB, Battery test position with battery status Meets IEC standard 60942 1997-11 Frequency : 1000 Hz Accuracy : ±5% Sound Pressure Level 94 dB Accuracy : ±0.5dB (94dB), ±1dB (114dB) Distortion <2% Total Harmonic Distortion (THD) Power Supply Two Heavy duty, alkaline 9V Battery Power consumption Approx. 10mA DC Supplied with batteries, carrying case, and screwdriver</p>	N		2				
25	<p>Portable air quality Features: Checks for Carbon Dioxide (CO2) concentrations, Calculates statistical weighted averages of TWA (8 hour time weighted average) and STEL (15 minute short term exposure limit), Maintenance free NDIR (non-dispersive infrared) CO2 sensor, User programmable audible alarm Backlit triple LCD display Built-in RS-232 interface for capturing readings on PC, Wet Bulb and Dew Point Calculated, Data acquisition software and cable included to record and document CO2, Humidity and Temperature data Measurement ranges: CO2: 0 to 5,000ppm Temperature: -10 to 60°C , Acc : 0.1°C& Humidity: 0.0 to 99.9%,Acc : 0.1% Carbon DioxideRange : (CO2) 0 to 5,000ppm, Resolution : 1ppm Complete with software and cable, batteries and carrying case</p>	N		2				
26	<p>Indoor Air quality monitor/Datalogger Measures CO2, Temperature, Humidity, Dew Point and Wet Bulb Features: Checks for Carbon Dioxide (CO2) concentrations, Maintenance free dual wavelength NDIR (non-dispersive infrared) CO2 sensor, Data hold, Max/Min with Time stamp, and Alarm, Easy calibration in fresh air Temperature: -20 to 60°C , Resolution : 0.1°C& Humidity: 10 to 95%RH, Resolution : 1%, CO2 : 0 to 6,000ppm & Resolution : 1ppm Datalogging : Continuous 20,000 sets/Manual 99 sets, • Supplied with batteries, RS-232 cable, and Windows® 95/98/NT/2000/ME/XP compatible software</p>	N		1				

27	<p>Oxygen monitor Oxygen Gas Monitor in confined space with integrated sampling pump, datalogging</p> <p>Oxygen: 0-25% v/v Resolution: 0.1% Alarms: Audio, Visual, Vibration Certifications: IEC Ex ia d IIC T4 Gb, ATEX Ex II 2 G Ex ia d IIC T4 & IP67 Complete with:, User Manual, Instrument charging/comm. clip, Universal charging adaptor, data logging package, Manufacturer's calibration certificate, 3 meter tygon tubing with connector</p>	N		1				
28	<p>PH meter (Table Top), ab junction PH meter Display : 3 ½ Digit LED Range pH : 0 to 14.00, Resolution : 0.01, Accuracy : ± 0.01 pH mV : 0 to ±1999, Resolution : 1, accu :± 1 mV Sensor : Combined pH Electrode Temperature Probe With auto temperature compensation, Gel filled Epoxy body combination pH elctrode & RTD temperature probe , with recorder output & slope controfacility. 3 1/2 digital LED display (Table Model)</p>	N		2				
29	<p>Digital spectrophotometer Range 190 to 1000 nm with facility for automatic concentration, SPECTRAL BANDWIDTH : 2 nm, ACCURACY : +/- 0.5 nm, REPEATABILITY : +/- 0.3 nm Motorised Microcontroller based wave length selection, 4 digit LED display for wavelength, 3½ digit LED data display.</p> <p>It has 4 position sample holder with position selector control for 10mm path length cuvettes.A set of 2 quartz cuvettes is provided. PHOTOMETRIC RANGE : % T : 0 to 100% Abs. : 0 to 1.999 Conc. : 0 to 1999, ACCURACY : 0.005 Abs at 1.0 Abs, 0.010 Abs at 1.5 Abs, LIGHT SOURCES : a) Tungsten - Halogen Lamp (b) Deuterium Lamp, DETECTOR : Wide range silicon photodiode, SAMPLE HOLDER : 4 Position sample holder, POWER : 230V 10% 50Hz, AC... supplied with Quartz Cuvettes : Set of 2 (10mm pathlength), Dust Cover, Disposable Cuvettes- 4 no, Main Lead & user manual</p>	N		1				

30	<p>Lab junction clorimeter Digital Colorimeter FEATURE : Direct Concentration facility, Highly stable and Accurate High Std. Glass Filters : 312 – 8 Filters, Minimum Volume : 1 ml Display :2 ½ Digit 7-Segment Red/ LED Range : 400 - 700 nm Output : Abs: 0 - 1.99 Resolution : Abs: 0.01 Accuracy : 0.5 % FS ± 1 Digit Detector : Photocell/Diode Filters : 8-Filters 400, 450, 490, 520, 540, 570, 620, 680 nm Light Source : 6.8 V, 300 mA Tungsten Lamp Power : 230 V ±10% AC, 50 Hz Accessories Quartz cuvettes of 10 mm pathlength, Manual and Dust Cover</p>	N		1				
31	<p>Digital pH water meter Waterproof pH Meter Rugged replaceable flat surface pH electrode for quick on-the-spot pH measurements, Simultaneous display of pH and Temperature, 2 or 3 point calibration automatically recognizes buffer solutions (order pH buffers separately), PTS (percent of slope) , Automatic Temperature CompensationData Hold, Min/Max, Auto Power Off, and low battery indicationWaterproof design (IP57), pH range : 0 to 14.00pH, resolution : 0.01pH, acc : ±0.2pH , Temperature : 0 to 90°C, Resolution : 0.1°, accuracy : ±1°C Complete with flat surface pH electrode, protective sensor cap, and batteries</p>	N		1				
32	<p>Lab junction DO. Meter(for dissolved oxygen) Compact Dissolved Oxygen Meter Features : Measures Dissolved Oxygen and % Oxygen & Temperature Automatic Temperature Compensation via temperature probe sensor built into polarographic type oxygen probe, Adjustable Altitude and Salinity Compensation, Min/Max and Data Hold functions, Auto Power Off with disable feature DO Range 0 to 20.0 mg/L, Acc : ±0.4 mg/L, Oxygen : 0 to 100.0%, Acc. : ±0.7% Temperature : 0 to 50°C & Acc : ±0.8°C, Compensation & Adjustment Salt: 0 to 39% Altitude: 0 to 3900m Supplied with DO probe with membrane and 4m cable, spare replacement membranes, electrolyte, battery, and soft case</p>	N		1				

33	<p>Digital water and soil analysis kit (7 parameter) 3½ digit LCD display covering 8 parameters: pH, Conductivity, TDS, Salinity, Colorimeter, Turbidity, Dissolved Oxygen & Temperature Display: 3½ Digit LCD. Measurement Ranges:- pH: 0 - 14 pH. Conductivity: 0 - 20 mS. Temperature: 0 - 100 °C. TDS: 0 - 20 ppt. Dissolved Oxygen: 0 - 20 ppm. Turbidity: 0 - 1000 NTU. Salinity: 0 - 50 ppt. Colorimeter; Abs: 0 - 1.99; Filter: 5; Resolution: 0.01 A. Power Supply: In-built Chargeable Battery 230 V ± 10% AC, 50 Hz. ACCESSORIES: pH Electrode, Cond/TDS/Salinity cell, DO Probe, Temperature Probe, pH Bottles, pH Tablets, Turbidity Test Tubes, Colorimeter Test Tube, Mains Lead, Operation Manual.</p>	N		1				
34	<p>Air flow meter (digital anemometer) Pitot Tube Anemometer+Differential Manometer Max/Min/Avg recording and Relative time stamp, Data Hold and Auto power off functions, Large LCD display with backlighting, 1Zero function for offset correction or measurement, Store/Recall up to 99 readings in each mode Pressure Range:psi: 0.7252psi, Res: 0.0001psi, Accuracy: ±0.3%FS Pressure Range:mbar: 50.00mbar, Res: 0.01mbar, Accuracy: ±0.3%FS Pressure Range:inH₂O: 20.07inH₂O, Res: 0.01inH₂O, Accuracy: ±0.3%FS Pressure Range:mmH₂O: 509.8mmH₂O, Res: 0.01mmH₂O, Accuracy: ±0.3%FS Pressure Range:Pa: 5000Pa,Res: 1Pa, Accuracy: ±0.3%FS Linearity/Hysteresis: ±0.29FSPressure: 10psi Air Velocity/Flow: Range: ft/min: 200 to 15733, Res: 1, Accuracy: ±1% FS & others ft/m, m/s, km/h, MPH, knots, CFM/CMM, Temperature Range : 0 to 50°C Pitot Tube: 15.4 x 7.7", Diameter 0.32" (8mm) , Supplied with Windows® compatible software with cable, battery, pitot tube with connection hoses, and hard carrying case</p>	N		1				
35	<p>Microscope Parallel Optics Zoom Stereoscopic/Video Microscope, Trinocular, Magnification: 6.3 X to 40 X with standard Delivery, Zoom Magnification: 0.63X to 4.0X Zoom Ratio: 6:1, Supplied with Standard Accessories:- WF Micrometer Eye Piece Pair 10X Inclined Binocular tube at 45° , Digital Image Capturing Device, With PC Interfacing,5–Mega Pixels Resolution</p>	N		1				

36	SAFETY:	N					
a	Safety shoes	N		5			
b	safety Gloves	N		5			
c	Safety Belt	N		5			
d	Safety Helmet	N		10			
e	Safety Jacket	N		5			
f	Dust and pollution mask	N		10			
g	Hearing protection(Earnoff)	N		5			
h	Face protection	N		5			
i	Anti-Fog clear safety goggle	N		20			
j	fire extinguisher (6kg)	N		5			

Authorized Signatory	
Name & Signature with Seal	
Date	
