INDIRA GANDHI INSTITUTE OF TECHNOLOGY
SARANG, DHENKANAL (ODISHA) - 759 146
(*An Autonomous Institute of Govt. of Odisha*)

No. IGIT/ Dip/CP/2020/CP/59 **Date: 13.02.2020**

NOTICE INVITING TENDER

Subject: ***Tender for procurement of Equipments of Department of Civil/Electrical/ETC/ Mechanical and Metallurgical and Material Engineering, the details specification is available in Annexures.***

For and on behalf of IGIT Sarang, sealed Tenders are invited from eligible reputed agencies / vendors / manufacturer / suppliers having valid GST registration/PAN/TIN clearance for procurement of ***Equipments*** under Diploma head. The details specifications and the list of equipments are given respective annexure I to V. The same is available in the office and our website www.igitsarang.ac.in.

The detail tender completed in all aspect along with a Bank Draft drawn in favor of Principal, IGIT, Sarang payable at SBI, IGIT Sarang(Code: 10246) for Rs. 500/- as the non-refundable tender fee may be submitted in sealed envelope in the office of the **Director, (Special attention to Chairman Central Purchase Committee, Diploma) I.G.I.T. Sarang, District: Dhenkanal, Pin: 759146 (Odisha) by Speed Post / Registered Post** under strong sealed cover marked as "**TENDER for Procurement of Lab Equipment (Diploma).**The Tender should be accompanied with EMD, 2% of the quoted value (Refundable) of equipment on the tender documents in the form of Demand draft drawn in favor of **Principal** , IGIT, Sarang payable at SBI ,IGIT, Sarang, Code: 10246

Important Dates & Time

Sl.No.	Particulars	Important Dates	Time
1	Date of notification and sale of Tender documents	15.02.2020	10.30 AM
2	Last date & time for submission of tender	29.02.2020	01.00 PM
3	Date & time of opening of Technical Bid	03.03.2020	3.30 PM
4	Date & time of opening of Financial Bid	06.03.2020	3.30 PM

Bid Opening Venue: Office of the HOD, Department of Civil Engineering, IGIT Sarang

1. Tender in complete shape must be accompanied by attested copies of valid Registration certificate /PAN Card /**GSTIN** Certificate. Relationship certificate along with Original Money Receipt towards purchase of Tender paper & required EMD in the shape of D.D.
2. The details of Tender can be obtained from the office of **Coordinator, Diploma** during working dates &office hours (8.00 AM to 12.10PM & 2.00PM to 4.30PM). Please visit our website www.igitsarang.ac.in.
3. The tender documents can also be down loaded from our website www.igitsarang.ac.in.
4. The authority reserves the right to accept or reject any or all the bids or parts without assigning any reason thereof.
5. The undersigned will not be held responsible for any postal delay.
10. Bids must be accompanied by Earnest Money in the shape of a Demand Draft (for an amount as mentioned in the Table) drawn in favor of "Principal, IGIT Sarang", and payable at IGIT Sarang. Each Tender shall be accompanied with separate EMD. This Earnest Money in the shape of Demand Draft must be enclosed inside the "Technical Bid". Bids without containing the required amount of Earnest Money/Tender cost in the shape of Demand Draft(s) inside the 'Technical Bid' will not be taken in to consideration.

DIRECTOR

INDIRA GANDHI INSTITUTE OF TECHNOLOGY
SARANG, DHENKANAL (ODISHA) - 759 146
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RECORD OF SALE OF TENDER DOCUMENTS

1. NAME OF THE WORK – Supply of Equipment for …….**Department.**

2. CALL NOTICE NO: -

3. COST OF TENDER DOCUMENTS: -Rs.500.00 (Non-refundable)

4. DEMAND DRAFT NO & DATE:-

5. DATE OF ISSUE OF TENDER DOCUMENTS: -

6. LAST DATE OF RECEIPT OF FILLED TENDER DOCUMENTS AS PER CALL NOTICE:-

7. TOTAL NUMBER OF PAGES IN THE TENDER DOCUMENTS:-

Signature of the bidder

INDIRA GANDHI INSTITUTE OF TECHNOLOGY
SARANG, DHENKANAL (ODISHA) - 759 146
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TENDER DOCUMENT

For

DIPLOMA

DETAILS OF ITEM

Department	Page number (Equipment detail)
Civil Engineering	Annexure IV (pp. 22-32)
Electrical Engineering	Annexure V (pp. 33-44)
Mechanical Engineering	Annexure VI (pp. 45-48)
ETC Engineering	Annexure VII (pp. 49-50)
Metallurgy Engineering	Annexure VIII (pp. 22-32)

Tender No. ---------- Dt. ----------

1. Name of the Firm :
2. Address :

3. Phone No :
4. Contact Person with Mobile :
5. PAN (Copy enclose) :
6. TIN (Copy enclose) :
7. Tender Fee Details :

Declarations:

I/We do hereby declare that, I/We have gone through the details of the technical specifications and other terms and conditions mentioned in Tender Paper received against the Tender Tender No. ---------- Dt. ----------and will abide by them.

Signature of the Bidder with seal

1. Terms & Conditions:

1. The Quotation paper filled in every respect must reach the undersigned with copies of relevant documents on or before 29-02-2020 by 1.00 PM by **Speed Post / Registered Post**
2. The Bidders are requested to submit the Technical Bids and Price Bids separately in two different covers. Each cover should be earmarked as to know the contents within as either "Technical Offer" or "Price Offer". Both these covers should be placed in a third cover super scribed as TENDER FOR THE SUPPLY OF ***Equipments of Department of Civil/Electrical/ETC/Mechanical/Metallurgical and Material Engineering(Department wise separately)***
3. Quotation of the Bidders who qualify for the Technical bid will be eligible for Commercial comparison. The bidders, who do not qualify the Technical bid, will have their quotation rejected.
4. Copies of the credibility certificates and valid authorization certificates of various products must be enclosed with the quotation.
5. The firm is required to enclose copies of its current valid VAT clearance certificate and PAN certificates with the quotation.
6. In case of negligence of the firm, the undersigned reserved the right to cancel the order and action may be initiated as deemed fit against the firm.
7. The quoted prices must be according to concessional rates and taxes applicable to educational intuitions
8. All Tenders will be evaluated and compared on the basis of the following order:
   i. Compliance with the instructions/General Conditions of the Tender
   ii. Conformity with the specifications (Annexure-IV)
   iii. Proof of ability
   iv. Delivery Period
   v. Guarantee/Warranty, expiry period offered (Minimum 1 Year)
   vi If any equipment found defective/stop functioning within Guarantee/Warranty period, the party should repair or replace the same within one month from the date of complain
   vii. Quality
   viii Price
   ix Past experiences
   x. Authorization letter from Manufacturer
9. The following documents should accompany the Tender
   i. Tender duly completed and signed
   ii. Specifications
   iii. Bidding data sheet/Offer sheets duly completed and signed
   iv. Tender Fee

v. EMD as applicable

vi. Copy of VAT, GST and CST Registration

vii. Certificate of incorporation/Business Registration

viii. All other documents as mentioned in the terms and condition

ix. Authorization letter from Manufacturer

10. Service tax may be charged against as per the rules applicable to an educational institute

11. If any dispute arises, the institute will try its best to solve it through discussion. Unless solved through discussion it is subjected to Kamakhyanagar (Dhenkanal) court jurisdiction.

12. The Bidders are required to submit the quotation papers filled in with other supporting documents failing which, they may be rejected

13 (i) The payment will be made on submission of bills after complete satisfactory supply, installation, operation / functioning/Demonstration and dully verification of items as per OGFR/ IGIT rule. No advance payment will be made against the supplies. Addition to this on complaint when ever reported it should be rectified within 7 days.

(ii) Counter conditions by the Bidders in matters concerning payment of bills shall not be acceptable.

14. The Time schedule should be strictly followed by the agency. If the work is not completed within stipulated schedule, penalty will be imposed as mentioned below:

(i) The Agency will strict to the time schedule i.e. 30 days for completing the supply order,

(ii) In case of any abnormal irregularity noticed the penalty will be levied by IGIT. The decision of authority will be final and binding,

(iii) In case the successful bidder fails to complete the order in part or in whole, as the case may be, the penalty as deemed fit including forfeiting the Performance Security/EMD by the Competent Authority shall be imposed on the bidder,

15. The undersigned reserves the right to reject any or all quotations received without assigning any reason thereof

N.B:- Incomplete data in any respect is liable to rejection

2. Eligibility of Bidder and General Instructions:

2.1 *Eligibility:*

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

a. The Bidder must be a reputed original equipment manufacturer and /or the authorized Dealer of a reputed manufacturer. Manufacturers should provide all documents relating to their manufacturing capabilities.
b. The Bidder should be an authorized dealer of a reputed manufacturer for the item quoted. Necessary certificate to this effect from the manufacturer must be enclosed.
c. All after sales support should be provided directly by the manufacturer only.
d. The Bidder must have the willingness for providing comprehensive maintenance support of the machine/equipments supplied by him.
e. The Bidder must provide evidence of successful execution of supply orders with installation and successful after sales support in at least 3 reputed organizations.
f. The Bidder must have cleared sales tax, Service tax and income tax payment up to date. Attested copies of sales tax clearance certificate or non-assessment certificate from the concerned sales tax authority valid up to date and attested copy of income tax clearance certificate or non-assessment certificate, as the case may be, from the competent authority, up-to-date and copy of PAN card must be enclosed along with the tender documents. The company registration no. & **GSTIN** Certificate must be given along with the tender.

2.2 General Instructions

1. Submission of more than one bid by a particular bidder under different names is strictly prohibited. In case it is discovered later on that, this condition is violated, all the tenders submitted by such bidder (s) would be rejected or the contract if assigned would be cancelled.
2. All offers should be in English and the price quoted for each item should be firm.
3. Warranty period, Delivery period and after sale service conditions, etc. are also to be clearly indicated.
4. The rates and conditions of the offer will remain valid for three months from the date of opening of the tender and no change or alteration of the rate will be acceptable on any account.
5. Submitted tender forms with overwriting or erased or illegible specifications and rates will be rejected.
6. Request from bidder in respect of addition, alterations, modifications, corrections, etc, of either terms or conditions or rate after opening of the bid may not be considered. However, negotiation may be made before finalization.
7. Bidders shall carefully examine the bid documents and fully inform themselves of all the conditions, which may in anyway affect the work of the cost thereof.

8. Should a Bidder find discrepancies or omissions from the specification or other documents and any doubt as to their meaning, he should at once notify the purchaser and obtain clarification in writing.
9. This, however, does not entitle the Bidder to ask for time beyond the due date fixed for the receipt of tenders.
10. The bidder must also specify minimum up time and maximum time to repair/replace in the event of a failure and penalty thereof.
11. Verbal clarification and/or information given by the purchaser or its employees or representatives shall not be binding on the purchaser.
12. Submission of sealed bid will carry with the implication that the bidder agrees to abide by the conditions laid down in the detailed particulars of the bid notice.
13. Conditional offers and offers qualified by vague and indefinite expression, as 'subject to immediate acceptance' 'subject to prior sale', etc will not be considered.
14. While tenders are under consideration, bidders and their representatives or other interested parties are advised to refrain from contacting by any means, to the purchaser's personnel or representatives on matter relating to the tenders understudy.
15. The purchaser if necessary will obtain clarification on tenders by requesting such information from any or all the bidders either in writing or through personal contact as may be necessary.
16. The bidder will not be permitted to change the substance of his offer after the tenders have been opened.
17. In the event of non compliance with this provision, the tender is liable to be disqualified.
18. The Tender shall submit the tender bid in two parts (Part –A & Part –B). In the case, where Part – A of a bid fails to comply properly (i.e. the technical specifications/Make of the bid is not matching with the required technical specifications of each item and other Technical bid criterion as mentioned in the tender paper), the bid will not be considered for further processing. Such bids will be accounted as disqualified. In that case Part-B of the bid will not be opened wherever required, the decision of the tender committee in this regard is considered as final.

2.3. Submission of Tenders;

Bidders are advised to fill up the prices in the prescribed format only. The tender shall be submitted in two parts (Part –A & Part –B).

Part - A

It will cover the **Technical Bid** such as the Letter of Application, Commercial Terms and Conditions, **GST Regd.** Certificate, Income Tax Clearance Certificate / PAN, Documentary Proof of satisfying the required eligibility criteria specified in Tender Notice, Undertaking for registration in Odisha Sales Tax Department in case of order (for bidders not possessing OSTRC), Bank Draft towards cost of Tender Paper (Not applicable for the firms participating in the tender by downloading the tender document from IGIT Sarang website) and EMD etc.

This part will also include the required Drawings, General Conditions, Special Conditions, Technical Specifications, Guaranteed Technical Particulars and Deviations, if any. Any document the firm is willing to furnish other than the Financial Bid shall be submitted with this Technical bid.

Part - B

It will cover only the **Financial bid**. No other documents except the financial bid should be enclosed in this part-B.

Each envelope (one for Part-A, the Technical bid and the second for Part-B, the Financial bid) shall be duly sealed separately. The envelope containing documents for Part-A shall be super-scribed with "**Technical bid**,**"** and the envelope containing documents for Part-B shall be super-scribed with "**Financial bid"**. Both these sealed envelopes should be enclosed in a bigger envelope super-scribed with **"**Bids for **Supply of Equipment for the Department of …… Engineering, IGIT Sarang, Parjang, Dhenkanal, Odisha-759146**, Dates of Opening: (a) Technical bid: 03.03.2020 at 2:30PMand (b) Financial bid: 06.03.2020 at 2:30PM" and sealed properly. This sealed bigger envelope duly super-scribed as mentioned above should reach **Director, (Special attention to Chairman Central Purchase Committee, Diploma) I.G.I.T. Sarang, District: Dhenkanal, Pin: 759146 (Odisha)** on or before the Tender Closing date: 29.02.2020 at 1.00 PM by Regd. Post/Speed Post only. No other mode of submission is accepted.

3. Requirements by Bidder before Supply:

3.1 Rating Plate, Name Plate and Labels:

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

3.2 Packaging:

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

3.3 Inspection:

a. All materials / equipment shall be inspected and tested for completeness, proper assembly, operation, cleanliness and state of physical condition and performance as per quoted specification.
b. The test shall be conducted, reported and certifications to be provided by the bidder. The bidder shall provide all test and measuring equipment/tools required for inspection / testing. The cost of all such tests shall be borne by the bidder.

c. IGIT Sarang reserves the right to reject any equipment if it does not comply with the specifications during site testing, installation and commissioning stage. In case of rejection, the bidder has to pay the expenses towards the return of the same equipment/ material.

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

3.4 Environmental Condition:

All the documents submitted must be in the papers showing the signature of the bidder and primed office name of the bidder on official seal.

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

a. Storage Temperature 0 to 70 degree Celsius
b. Operating Temperature 0 to 50 degree Celsius
c. Humidity 95% RH (non-condensing)

All the equipments are intended to operate under 220 V (Single Phase)/ 440V (Three Phase), 50 Hz power supply.

4. Requirements by Bidder after Supply:

4.1 Supply:

a. The material would be delivered by the supplier at Indira Gandhi Institute of Technology, Sarang, Dhenkanal, Odisha – 759146.
b. The items should be supplied directly from the manufacturing terminal having passed all tests successfully with Certifications as required.
c. The equipment should conform to the latest relevant National/International standards and shall be completed in all respect.
d. Any component, fitting etc. which may not have been specifically mentioned in the specifications but which are usual and necessary for the equipment, shall be supplied by the bidder at no extra cost.
e. In case, articles are found damaged in transit or found short at the time of delivery the full cost of the same will be deducted from the bill of the supplier in case the supplier does not replace the stock within two weeks from the date of the complain.
f. The articles ordered must be supplied in one lot within 4 (four) weeks of placing of the order.
g. In case of delay in delivery or successful installation, a penalty @ 1% (one per cent) of the bid value per week shall be levied.

h. IGIT Sarang reserves the right to procure the materials from alternative sources at the risk and cost of the successful bidder giving 15 days notice.
i. Any increase in tax and duties after expiry of delivery period will be to the seller's account.
j. In case the items supplied by the supplier are found not up to the specification shall be rejected.
k. The supplier will be intimated to take back the stocks at his own cost within three days from the date of rejection and to replace the same within 15 days, failing which the EMD will be invoked in addition to taking legal actions.
l. Imported consignment, if any, should be destinated to IGIT Sarang, Dhenkanal, Odisha, India through Bhubaneswar Air Port.
m. The suppliers shall be responsible for releasing the consignments from the carriers/transporters.
n. The equipment/machineries shall be delivered and installed at site at the cost of the bidder.
o. All taxes, levies, surcharges including the customs clearance and handling freight and insurance should be paid and handled by the bidder.

4.2 Installation and Commissioning:

Installation and Commissioning shall include the following:

a) Installation and Testing of the Equipment, Machineries etc. should be supplied by the bidder.

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

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

d) Installation must complete within a week after delivery on site.

e) The bidder should provide all necessary raw materials for running of the machine during commissioning and provide training to our laboratory personnel free of cost.

4.3 Documentation:

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

4.4 Trial Operation and Performance Guarantee Test:

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

4.5 On-Site Warranty:

a) The entire materials may be used continuously. The reliability and safety of the total installed system and trouble-free operation are, therefore, of prime importance. The supplied devices/equipment and components shall be covered under **two-years or more** comprehensive on-site warranty from the date of issue of successful completion of Performance Guarantee Report.

b) During the period of warranty, it shall be the responsibility of the bidder to provide all essential spares and consumables, which may be required for maintenance and trouble-free operation of the devices / components at the bidder's cost.

c) Software, if any, has to be tested with at least one-year warranty for trouble free operation.

4.6 Comprehensive Maintenance Contract:

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

4.7 After Sales Service:

a. During the warranty period and subsequently, after signing of Agreement for CMC the bidder shall attend to the problems reported by the users of IGIT Sarang on a priority basis.
b. For any problem reported the bidder shall attend and rectify the problem within 7 (seven) days or provide a standby system of the similar configuration.
c. The report on any problem will be informed through phone or fax number of which shall be given by the bidder.

d. The branch office of the concerned manufacturing firm will be fully responsible to provide maintenance service, in case of any negligence, in providing the service by the bidder.
e. On failure to comply with those instructions, the Bank Guarantee provided for the warranty period shall be invoked.

5. Financial Terms:

5.1 EMD (Refundable)

a. The bidder has to submit a Demand Draft / Banker's Cheque / Pay order as detailed mentioned above in favor of Principal, Indira Gandhi Institute of Technology Sarang payable at SBI, IGIT Saranga (IFSC Code SBIN0010246) towards EMD.
b. There will be no interest paid to the bidder towards EMD money.
c. In no case, the EMD Money in cash or other forms will be accepted at the time of opening of the bid.
d. No request for adjustment of claims, if any, will be accepted.
e. The EMD of unsuccessful bidders will be refunded as soon as possible after the tenders are finalized. The EMD must be claimed by the bidder personally or by authorized letter addressed to the Principal and Secretary IGIT, Sarang, within one year.

5.2 PRICES:

a. Price quoted should be FOR IGIT Sarang only.
b. Price should be quoted for unit item; however, the actual system requirements may be much more.
c. Purchase order will be placed as a single lot for each type of item or for all the items together, as the case may be.
d. In case of items of import, the bidder should take full responsibility for customs clearance, handling, tax payment, etc. and specify the charge for the same in the financial bid.

5.3 Sales Tax Concession:

Central Sales Tax/ GST Concession (if any) is to be availed on production of the required certificates applicable to Educational Institution.

5.4 Discount:

a. Our Institute is a pioneer Institution in the field of Teaching and Research in Engineering and allied disciplines and do not run with profit motive.
b. As such we are availing price discount for purchase of equipment/instruments/chemicals.
c. The rate of discount or any other Institutional benefit arising out of Govt. Policy etc./ company's own policy on each item may also be indicated in the Financial bid specifically.

5.5 Payments:

In case of imported items, payment will be made by opening LC in the name of the manufacturer subject to the condition that a Bank Guaranty for an equal amount will be submitted by the selected Bidder to IGIT Sarang for the period of completion of installation and commissioning. In case of purchase in Indian Rupees, payment of 100 % (percent) of the ordered value wills is made after successful installation and commissioning of the equipment subject to submission of satisfactory performance report by our Professor-in-Charge.

5.6 Penalty:

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

5.7 Rate Contract with DGS&D or any other Government Organization:

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

6. Technical Specifications:

a. Following are the minimum specifications of the equipment/ Machineries.
b. The minimum specifications are indicative and not exhaustive.
c. The models with higher specifications may be quoted.
d. The quoted materials should be of latest trend and technology & software if any should be compatible to all versions of windows.
e. Each of the equipment should be complete in itself without needing any extra requirements except the requirement of general test and measuring instruments.
f. **One can submit the tender for all the groups as per item description or individual group.**

7. IGIT, the bidder and the manufacturer shall make all efforts to resolve amicably by direct informal negotiations on any disagreement or dispute arising then under or in connection with this contract. If any dispute arises, the institute will try its best to solve it through discussion. Unless solved through discussion it is subjected to Kamakhyanagar (Dhenkanal) court jurisdiction. The authority reserves the right to reject/ accept tender without assigning any reason thereof.

DIRECTOR

Annexure-I

Tender Form (Technical Bid) format

(To be submitted by the bidder on their letter head.)

To ---------- Ref:-

----------Date:

Tender Notice Number and Date Name of Work order: …."

The date and time of opening of tender: - at

Format for Qualifying Details of Technical Bid

A. General Details of the Bidder:			
Sl. No.	**Particulars**	**Remarks/Documents to** be **attached**	
01.	Name of the Organization:		
02.	Address of Head Office: Telephone No: E-mail: Fax number (if any) Name(s) of the contact person(s):		
03.	Company Status: - Proprietor / Partner / Pvt. Ltd. Company Enclose Details. -		
04.	Turnover of the Agency for the last three years: Annualized average financial turnover equivalent to Indian Rupees during last three financial years	Year INR (in Lakh) 2017-18 2018-19 - 2019-20 -	
05.	Indian Income Tax Return Acknowledgement	Financial Year- 2017-18, 2018-19,2019-20	
06.	Income Tax-PAN No.		

07.	VAT Tax Payer Identification Number (TIN)		
08.	Constitution of Firm (Proprietor / Partnership / Company/ Society)	Company Incorporation Certificate	
09	VAT Clearance Copy : -Service Tax Registration		
10.	Details of clients for whom similar works order are under taken, along with value of orders executed. (A) (B)	Details of the work Client- Name of Work order: - Work Order No. Date of Work Order Stipulated Date of Completion as per contract agreement: Actual Date of completion: Completion Cost: C Client Address, e-mail & Contact Number	
11	Other Details		

Signature of the Bidder with date and seal

DECLARATION

I/We ……do hereby declare that, the documents submitted /enclosed are true and correct. In case any document at any stage found fake / incorrect, actions as deemed fit by the authority can be taken against me. Also we hereby accept all the Terms & Conditions of the Tender and will abide by it.

A Processing Fee / EMD demand draft bearing No_____ dated

Drawn on_____ is enclosed with the Technical bid.

Signature, Name Address…

Mobil
Date: -
(With the seal)

Annexure-II

ACCEPTANCE OF THE BIDDERS

All the clauses of tender document and Terms and Conditions as detailed in the Tender Document have been read/understood by me / we are acceptable to me / us. I / we confirm that we will abide by these terms & conditions.

Dated: - Signature

(Name in Block letters)_____Name of Bidder _____

Address _____ with stamp

UNDERTAKING

To

The Director,
IGIT Sarang,
ODISHA

Sir,

1. I / we the undersigned, certify that I/we havee gone through the terms and conditions mentioned in the tender documents and undertake to comply with them.

2. It is further certified that our firm has not been blacklisted by any agency in India or abroad.

Dated:

Signature and address of the bidder with the seal

INDIRA GANDHI INSTITUTE OF TECHNOLOGY, SARANG

(An autonomous institute of Govt. of Odisha)
Sarang, Dhenkanal, Odisha– 759146

ANNEXURE- III

FINANCIAL BID

(Should be submitted in a sealed envelope separately)

List of equipment

Sl. No.	Name of the Equipment	Quantity	Unit rate (Inclusive of all taxes F.O.R. to IGIT Sarang and installation etc.) (Rs.)	Total Amount (Rs.)
1				
2				
….	…	…	….	….
Continue…				

Signature of the Bidder with date and seal

CHECK LIST:

1. Tender Fee Demand Draft:
2. EMD Demand Draft
3. Registration certificate of the firm
4. PAN No
5. Service Tax
6. Sales Tax/VAT/WCT/TIN
7. Experience Certificate (Last 3 years)
8. Turnover Certificate issued by CA (Last 3 years)
9. Income Tax Returns (Last 3 years)
10. Annexure
11. Undertaking

Signature of the Bidder with date and seal

Annexure-IV

(Equipments for the Department of Civil Engineering)

Sl. No.	Equipment Name	No.	Specification
1	Cube mould (100 mm)	12	IS:516 -1959 (reaffirmed 2004), IS:10086 -1982, individual type
2	Cube mould(70.5 mm)	18	IS:4031 (part 6) -1988 (reaffirmed 2005), IS:10080 - 1982
3	Cylindrical mould for concrete (150 mm diameter x 300 mm height)	12	IS:516 -1959 (reaffirmed 2004), IS:10086 -1982
4	Split mould for UCS(100mm X 200 mm)	4	IS: 2720- part 10 (1991)
5	CBR mould	10	IS:2720(part 16)- 1987, moulds with base plate, stay rod and wing nut, collar, spacer disc, metal rammer
6	Permeability Mould	2	IS:2720 (part17) - 1986
7	Rammer for bituminous compaction (4")	3	As per relevant IS standard
8	Rammer for bituminous compaction (6")	3	As per relevant IS standard
9	Vibratory table	2	Vibration table for concrete, IS: 2514- 1963 (reaffirmed 2001), size 1m x 1m and capacity 1 tonne
10	Automatic compacter(Bituminous mix)	2	Automatic Compactor for Bituminous Mixes for 4" & 6" moulds Paint quality:-Powder coating paints with 80-100 micron thick. Suitable operation on 230V,50Hz, single Phase, AC supply, EN 12697-10-30 standard
11	Digital Marshall Apparatus	1	Digi Marshall Apparatus, 50 kN, Single Speed, for 4" dia sample, Ref. Standards-ASTM D1559,ASTM D6927-

			06,BS598- 107,EN12697-34 a. Provide measurement data for use with hot mixture containing asphalt or tar and aggregate up to 25.4mm mixture size b. Single speed, Bench top load frame c. Max. loading capacity, 50KN d. Greed screw jack and motor drive e. Precise Speed f. Limit switch protection for both upward & downward travel
12	Proving ring for Marshall apparatus (25 kN)	2	25 KN capacity, Integral type and compression proving ring, IS:4169- 1988
13	Proving ring for Marshall apparatus (50 kN)	2	50 KN capacity, Integral type and compression proving ring, IS:4169- 1988
14	Automatic compacter(Soil compaction) for heavy compaction	1	For heavy compaction, Ref Standard IS:2720 (Part 8), with rammer
15	Automatic compacter (Soil compaction) for light compaction	1	For light compaction, Ref Standard IS:2720 (Part 7) , with rammer
16	Sieve set: 4.75 mm, 2.36mm, 1.18mm, 600 µ, 425 µ ,300 µ, 150 µ, 75 µ sizes	6	IS: 460 (part 1)- 1985 (reaffirmed 1998) , stainless steel or brass
17	Unconfined compressive strength test machine Motorized model	1	Unconfined Compression Tester Ref. Standards IS 2720-Part 10, for load measurement, supplied with Load Frame with 50 KN Capacity with Horizontal Clearance-265mm, Vertical clearance-700mm, Maximum Platen dia- 130mm with Hardness of material(platen): Maximum Platen Travel-100mm with Specimen dia-38mmto 30mm, Ram Dia 50mm with Four Speed 1.5, 1.25 2.5 mm/min and true speed control up to 15mm/min and Plain Platen with Adapter and Steel Ball High sensitivity proving ring capacity 2 KN. Dial Gauge 25 mm travel, 0.01 mm least count. Split Mould 38mm dia × 76mm long, Rubber

			Sheath for 38mm dia specimen. Paint quality:-Powder coating 70-80 micron thick Frame Stiffness:-Approx 100kn/mm Material of Construction: Special quality low carbon mild steel
18	Dessicator	4	i. Borocil glass desiccators with cover ii. Porcelain plate iii. Agar gel
19	Hot plate	2	Max temp up to 200 ^{o}C, 230 v, 50Hz, Single coil and double coil system, Heating system for bitumen etc.
20	Pavement core drilling machine	1	Pavement Core Drilling Machine, Ref. EN 12504-1 a. Comprises of two vertical support columns which carry the drill head/engine assembly accurately with the help of screwed spindle b. Engine capacity 6HP, petrol engine c. Bit diameter : 150mm d. Maximum depth to core: 400mm e. Drill Speed: variable speed from 900 to 1200rpm f. Guide shafts: 40mm dia g. Screwed Spindle: 20mm dia h. Water Tap : 12mm i. Drill Wrenches : included
21	Dynamic cone penetrometer	1	Rapid in-situ measurement of the structural properties of road pavements a. Provides fast & efficient method of obtaining information b. For continuous measurements up to a depth of 800mm & 1200 mm with the extension rod. c. Portable & can be accommodated in a carrying case d. It incorporates a 8kg weight dropping through a height of 575mm and a 60 degree cone having a diameter of 20mm. e. Supplied complete with assembly tools and weighs 20kg approx. ASTM D 6951- 03
22	Bitumen, cement concrete and soil fatigue testing machine	1	Repeated Loading Testing Machine, Capacity 5 Tonnes, Bitumen Cylindrical specimen of 100 mm Dia 63 mm thickness, Soil specimen of 35mm dia and 75 mm height and concrete beam of 500mm length and 100mm square specimens can be tested. Frequency of actuation: 1 Hz to 10 Hz and loading periods and Rest periods of the sine wave can be varied from 0.1 Second to 0 second ❖ Capacity : 0 – 5T ❖ Maximum Stroke : 0 – 125 mm ❖ Height : Appx. 1.5mts. ❖ Base width : Appx. 0.7mts. ❖ Loading arrangement : Hydraulic

Actuator.

- Type of control : Displacement
- Feedback element : Load cell, LVDT
- Type of Wave form : Haver Sine
- Data monitoring and computation: Through DAQ & Computer
- Specimen : Soil Specimen

Dia35 mm: Height 75 mm
BITUMUN specimen
Dia: 100mm Height: 70 mm
Concrete Beam Specimen500*100*100(mm)

- Power pack capacity : 3 Kw.
- Input Power : 440V 3 Ph.
- Protection : All safety precautions taken
- Temperature Control : Ambient to 70º C Oven
- Control Accuracy : Less than 0.5%.
- Rate of Load of frequency operation : 1 to 10 Hz continuous wave

form or 0.1 sec loading period and 0.9 sec rest period pattern
Maximum load capacity is 5 tons.

The system consists of the following –

- Loading frame
- Loading system-Actuator,
- Hydraulic power pack
- Proportional valve with controller.
- Furnace.
- Load cell – 04 Nos. and LVDT – 07 Nos.
- Signal conditioner for load and LVDT.
- Specimen mounting fixtures
- Data Acquisition card for signal monitoring, Waveform generation and control.
- Data monitoring and acquisition software.

Loading System: Loading system consists of: -

Loading frame: Two columns Vertical mount, 2Ton capacity Frame and a Rigid Platform to place the Specimen holder, Furnace and Fixture for mounting Horizontal and Vertical LVDTs.

Servo Amplifier:

The servo controller is a differential amplifier with PID control action, which supplies a servo valve with a current proportional to the difference of control and feedback voltage (Load cell).

- Power supply : ± 15 V.
- Input voltage range : ± 10 V.DC.
- Output capability : Max. Current ± 50 MA.

Max. Voltage ±10V DC.

- Proportional Gain : 5 – 200 MA/v.
- Linearity : ± 3% of full scale.
- Frequency Response : - 3 dB of f 800 Hz.

FURNACE:

Ambient to 70 Deg C to control the test specimen temperature [For Asphalt Round specimen only]

Feedback elements: Load cell, Displacement transducer, with its signal Conditioners. Brief specification is given below.

LOADCELL:

- Range : 0 – 0.1, 0.5, 2 and 5 tons.
- Type :S Type / Universal Type
- Sensor: Resistance Type Strain Gauges of 350 Ohms.
- Bridge configuration : 4 Arms.
- Bridge excitation : 10 volts DC.
- Sensitivity : 3 mV/v /Ton.
- Combined Linearity &Hysteresis : ± 0.1 %.
- Output Connections : Through 4 Pin Circular MS connector with 2 Meters of 4 core cable
- Temperature : 0 – 50 Deg. C.
- Material : EN – 24.

LOADCELL CONDITIONER:

- Range : 0 – 0.1, 0.5, 2 & 5 tons.
- Bridge : Full Bridge.
- Bridge Resistance : 350 Ohms.
- Bridge Excitation : 10 Volts DC.
- Read out : 3 ½

Digit DPM.

- Output : 0 – 5 Volts.
- Accuracy : Better than 0.5%.
- Input connection :

Through 5 pin MS Connector with 2 Meters Of 4 Core Shielded cable.

- Output : 2 Nos. of PT-10 terminals
- Power supply : 230 Volts. 50 Hz.

DISPLACEMENT TRANSDUCER:

Cylinder Piston Position LVDT – 01 No. of 150mm LVDT.
Horizontal LVDT – 02 No. Of 0-2mm LVDT /02 Nos. of 0-5mm LVDT/ 02 No. of 0-10mm LVDT
Vertical LVDT – 02 No. Of 0-2mm LVDT/ 02 Nos. of 0-5mm LVDT/ 02 No. of 0-10mm LVDT
Range
Horizontal deformation {H1 & H2] : 0-2 mm/10mm/5mm LVDT,
1 micron resolution
Vertical deformation [V1 & V2]:0-2mm/10mm/5mmLVDT
Hydraulic cylinder Position control :0-150mm LVD

- Excitation Voltage : Sinusoidal AC 1 volt at 4 K/C
- Input impedance : 100-Ohm Nominal.
- Linearity : Better than 0.5 %
- Output : 5mV FSD.
- Operating Temperature : 10 to 50°C
- Termination : Spring

DISPLACEMENT INDICATOR:

- Input sensor : LVDT Coil
- Excitation Voltage : 1 Volt at 4 kHz.
- Range : Calibrated For 2mm, 10mm & 150mm
- Accuracy : 0.5%
- Display : 3 ½ digit DPM
- Output : 0-5 Volts DC for FSD
- Power Supply : 230 Volts, 50 Hz.

CONTROLLER UNIT:

Controller and Signal Conditioning unit consists of the following –
Signal conditioners for 04 Nos. of Load Cells.
Signal conditioners for 07 Nos. Of LVDTs

			Electronic Controller for Proportional Hydraulic direction control valve. Temperature Indicator and Furnace controller **DATA ACQUISITION SYSTEM CARD DETAILS:** 8 Channel USB Based Data Acquisition Card: – NI Make USB Based 14 Bit 8 Channel Data Card along with Data Acquisition Software to acquire the necessary parameters in the range of +/- 5V. USB BASED DATA ACQUISITION CARD WILL BE USED FOR THE SOFTWARE: Software is window based and user friendly. Software will help in programming the following:- Load setting(Max 5 Tons) No. of repetitions/ Till Specimen Failure. Frequency [1-10 Hz]. Haver Sine Wave form. Online Graph of Load Output. Raw Data Storage of Load, H1, H2, V1 & V2 deformation readings in the user defined file. Post test data analysis. Software filtering for Raw data of load, H1,H2,V1 & V2 Resilient Modulus calculation for Bitumen Specimen only Tensile Stress for Bitumen Specimen only Initial Tensile Strain for Bitumen Specimen only Stress Difference for bitumen specimen only Specimen failure cycle **MONITORING AND COMPUTATION UNIT:** Dell Make Compatible Desktop PC with Pre-loaded repeated load and related driver software. Pre-Installed USB Based Data Acquisition hardware card. **HYDRAULIC SYSTEM** Hydraulic Actuators 1 ½ inch bore, 1-inch diameter rod and 125mm stroke. Hydraulic Power Pack consists of – Hydraulic Oil tank, Proportion DC Valve, Pressure Relief Valve, Pressure line filter, Pressure gauge, Electrical Motor [3 Ph], Hydraulic Pump, Hose Pipes, Temperature Sensor for Oil Temperature measurement. Separate Power ON Module for Hydraulic System. Actuator : 1 No. Dynamic : 5 Tons. Static : 5 Tons. Stroke : 125 mm. Max. Frequency at 1 mm amplitude : 10 Hz. Max. Working Pressure : 160 bar. Power Input : 5.5 KW
23	Sample eject (4" dia sample) for bituminous mixes	2	Bitumen sample extractor

24	Sample eject (6" dia sample) for bituminous mixes	2	Bitumen sample extractor
25	Buoyancy balance	1	Weight 10-20 kg, 110V, weighing capacity 10 kg, EN 12390-7
26	Density basket	3	IS: 2386 (part 3)- 1963(reaffirmed 2002)
27	Rammer for light compaction (soil)	2	2.6 kg, IS: 2720 – part vii – 1980 (reaffirmed 2011) and IS: 9198- 1979.
28	Rammer for heavy compaction (soil)	2	4.9 kg , IS:2720 (part 8) :1983 and IS:9189 - 1979
29	Liquid limit device (Casagrande's apparatus)	4	IS: 2720 (part 5) – 1985 (reaffirmed 2006), IS:9259-1979, Operation both manual & motorized with counter
30	Cube mould (150 mm)	24	IS:516 -1959 (reaffirmed 2004), IS:10086 -1982, individual type
31	Borosil Double distillation plant	1	i. Distillation Capacity - 4litre/hr ii. Quartz Heater iii. Water requirement- 2.5litre/min. iv. Conductivity - less than 10^{-6} S/cm v. Distillate temperature- 65-70°C Biological activity – pyrogen free
32	Core cutter with dolly and rammer	6	IS:2720 (part 29)- 1975 (reaffirmed 2005)
33	Sieve shaker	4	For 20 cm dia. sieve
34	Digital infrared thermometer	4	Range : - 50 to 300°C, 1 year warranty
35	Vernier caliper digital	4	Digital, least count 0.01mm, 1 year warranty
36	BOD Incubator	1	i. Internal volume: 280 litres ii. Number of tray: 3 iii. Internal dimension W x D x H (mm): 660 x 655 x 650 iv. External dimension W x D x H (mm): 800 x 1095 x 1220 v. Temperature range: 5°C to 60°C

			vi. Temperature accuracy: ±0.5°C vii. Temperature control: Microprocessor with PT - 100 sensor viii. Display: 1" - 7 Segment, Big Size LED ix. Power failure Alarm: Audio visual alarm x. Illumination: 8 Watts Fluorescent Lamp xi. Internal body material: Stainless steel - 304 grade xii. External Body material: Powder coated CRCA Steel xiii. Insulation: 70 mm minimum for Body & 80mm for Door xiv. Voltage stabilizer Power: 220-240 volts, 50 Hz, Single Phase
37	COD Digestor	1	i. Temperature range: Above and to 180°C or higher. ii. Resolution: 1°C iii. Digital Display 12mm RED LED. iv. Digital Electronic temperature controller. v. Heater Rating: 750 Watts. vi. Sensor: PT-100 vii. Timer: Selectable 15, 30, 45, 60, 90 or 120 minutes with alarm. viii. Hole size: 40mm dia X 80mm depth. ix. Glass tube: 38 mm Dia, 15 nos. (5 X 3 rows) x. Sample volume: 20 ml each. xi. Dimension: 500 W X 270 D X 210 mm H xii. Aluminum made of inner block. M.S. Powder coated outer body.
38	Jar test apparatus	1	i. Uniform stirring of up to 6 samples simultaneously. ii. Digital Display indicating rotational speed of 10 - 200 RPM. iii. Heavy Duty 1/20 HP motor with gear train mounted on a mild steel housing. iv. Stainless steel stirring paddlers with adjustable height. v. Locking collars. vi. Spacing of 150 mm between stirring rods to permit use up to 1000 ml beaker. vii. digital timer to count down from 1 to 99 minutes. viii. Housing material: CRC / MS sheet duly powder coated. ix. Power consumption: 220/230 V AC supply 50 Hz single phase. x. Built in illuminator. xi. 6 nos. 1000ml beaker. xii. Anti-glare curtain and dust cover.

			Standard operating procedure for apparatus operation.
39	Kjeldahl and digestion combined unit apparatus	1	i. 6 mantles for distillation in upper portion and 6 mantles for digestion in lower portion ii. Mantles made with knitted layer of glass fabric combined with flexible heating elements. iii. Mantles are encased in mild steel housing iv. Temperature ranges from ambient to 350°C v. Temperature controlled by individual SUN VIC Energy Regulator with corresponding indicating lamps vi. Digestion units are provided with a fume Duct with blower motor, blower housing and Turbo Blower with the unit. vii. Distillation units are provide with a condensing tank with individual condensing pipes are made of glass. Distillation and Digestion combined unit are placed on mild steel angle iron structure
40	Electronic weighing balance (up to 2kg)	3	Conformity to Indian Standards, IS:9281-3 (1981) part I,II, III & Part IV (latest), resolution 500 mg, BIS Marked
41	Electronic weighing balance (up to 10kg)	3	Conformity to Indian Standards, IS:9281-3 (1981) part I,II, III & Part IV
42	Electronic weighing balance (up to 500 gm)	3	Resolution (gms) 10 mg, Conformity to Indian Standards, IS:9281-3 (1981) part I,II, III & Part IV (latest), BIS Marked
43	Oven (hot air oven)	6	i. Temperature range: 5°C above ambient to 250°C max. ii. Temperature accuracy: ± 2°C iii. Temperature uniformity: ± 1°C iv. PID controller v. LED temperature Display. vi. Sensor: PT-100 vii. Heating Element: Nichrome wire / Kanthal A1 viii. Safety device: a) Over temperature protection, b) Electric leakage breaker. ix. Exterior chamber: MS powder coated. x. Interior chamber: 304 stain-less steel. xi. Insulation: Mineral Wool. xii. Solid doors with silicon rubber gasket and lock. xiii. Shelves: 2-3 stainless steel shelves (removable) xiv. Forced air circulation. xv. Power supply: 220V xvi. PLC controller

			xvii. Stainless steel outer cabinet. xviii. Audio / Visual alarm. xix. Heating Thermostat. xx. Manufacturer calibration certificate. xxi. Inner chamber: 605 W X 605 D X 910mm H Volume of inner chamber: 336 litres.

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ANNEXURE- V

(Equipments for the Department of Electrical Engineering)

A) Power Electronics Laboratory

Sl. No	Experimental Setup	Specifications	Quantity
1.	**Installation of the complete setup with test bench for the Experiment:** Study of the single phase half wave controlled rectifier circuit with R load.	Source V_S=230Vrms,50Hz Load: R=25 Ω, I=5.85 Amp. P=857.58 W	3
2	**Study V-I characteristics of SCR/TRIAC**	Trainer kit	3
3	**Voltage regulator**	IC78XX,79XX,LM317	3
4.	**Installation of the complete setup with test bench for the Experiment:** Study of the forward converter and fly back converter.	V_S=12V DC. Variable Load 250ohm/5Amp	3
5.	**Study of UPS and CVT**	UPS ,CVT	3
6.	**Construct battery charger**	multipurpose Battery charger	3
7.	**Installation of the complete setup with test bench for the Experiment:** Study of single phase full wave controlled rectifier circuits (midpoint and Bridge type) with R and R-L Load.	Source V_S=230Vrms,50Hz Load: R=50 Ω/5Amp, L=10mH/10 Amp, Rating of thyristor: V_{DRM} =1200V, I_{TAV}(180^0 conduction) =30 Amp, I_{TRMS}=50 Amp, fuse= GSG 1000/35	3
8.	**Installation of the complete setup with test bench for the Experiment:** Study of three phase full wave controlled rectifier circuits (Full and Semi converter) with R and R-L Load	Source: V_S =326Vrms, 50 Hz Load: R=50 Ω/5Amp, L=10mH/10 Amp, 50mH/10A. Rating of thyristor: V_{DRM} =1200V, I_{TAV}(180^0 conduction) =30 Amp, I_{TRMS}=50 Amp, fuse= GSG 1000/35.	3
9.	**Installation of the complete setup with test bench for the Experiment:** Study of the Buck converter and boost converter.	R_L=15Ω, L_L=30mH, V_S=12V DC. Time period=0.4 micro sec Duty cycle=41% L=145.85 mH, C= 200uF	3
10.	**Installation of the complete setup with test bench for the Experiment:** Study of the single phase PWM voltage source inverter.	Input voltage: 230 V (+/-10 %) AC, Single-Phase Out puts: -220 V to +220 V DC , I=7.5 amp Inputs: L=10mH/10 Amp C=1000mf/500 V DC 200 mA driver current Loads: R=50 ohm/5 Amp L= 10 or 50 mH/10 Amp or Above	3

11.	**Installation of the complete setup with test bench for the Experiment:** Study the performance of three phases VSI with PWM control.	Auto T/F-3 phase,440V,50Hz, Isolation T/f- 3 phase,440V,50Hz, Loads: R=50 ohm/5 Amp L= 10 or 50 mH/10 Amp	3

B) Electrical Drives Laboratory

Sl. No	Experiment Setup	Specifications	Quantity
1.	**Installation of the complete setup with test bench for the Experiment: Speed control of single phase Induction motor by using single phase AC to AC Converter.**	Single phase IM: 220V 5A,50Hz,1 H.P. 1440 rpm Class B motor Single phase centre tapped isolation TF 1KVA,230/230-0-230V. Single phase cyclo-converter power module: 230V/5A Tachometer: 0-10000 RPM Digital Storage Oscilloscope CRO: 100MHz, 1GS Single phase cyclo-converter power circuit module.	2
2.	**Installation of the complete setup with test bench for the Experiment: Speed Control of separately excited Dc shunt motor using Four Quadrant Chopper.**	Dc shunt motor with loading: 1HP, 1500 RPM, 220 V, 4.1 Amp Trainer kit –ITB-PEC16HV3 Input voltage: 230 V (+/-10 %) AC, Single Phase Output voltage: Armature voltage: 0 to 220 V, current: 7.5Amp Field voltage :180V to 220 V DC. Current: 1.5 Amp.	2
3.	**Installation of the complete setup with test bench for the Experiment: Speed Control of separately excited Dc shunt motor using dual converter.**	Dc shunt motor with loading: 1HP,1500 RPM, 220 V, 4.1 Amp Model :ITB-PEC14HV6, 8 SCRs rating: 1200 V /25 Amp	2
4.	**Installation of the complete setup with test bench for the Experiment:** **Speed control of three phase squirrel Induction motor using three phase AC to AC converter.**	Induction motor parameters: Line voltage 415V, 50 Hz, Stator resistance R_s=0.435 ohm, Stator inductance L_s=4mH, Rotor resistance R_r=0.861 ohm, Rotor Inductance Lr=1 mH,4 pole,1500 rpm. Input=415V,output=415V, I_{rating}=3A Three phase SCR converter Circuit,6A power supply three phase fuse TCA785 based inbuilt firing scheme.	2
5.	**Installation of the complete setup with test bench for the Experiment:** **Speed control of three-phase SRIM by Rheostat control method.**	Three phase IM,5Hp,4 pole Bridge rectifier diode 6A,400V Power Analyzer, Variac Stator voltage=361.2,I=3.7A Rotor voltage=7.8V,I=0.4A	2

C) Control System & Instruments Lab

Sl No.	Instrument Name	Specification	Quantity
1	**Interface of PLC with PC for data acquisition system**	**GM10 Data Acquisition Module, GM90MB Module Base, GM90PS Power Supply Module**	**1**

D) Energy Conversion Laboratory

Sl. No.	Items	Specifications	Quantity
1	Phase sequence indicator	-	2
2	Voltmeter	250/500V DC	10
3	Voltmeter	7.5/15/30V DC	10
4	Pliers	9”	6
5	Sly wrench	6”	3
6	Sly wrench	12”	2
7	Sly wrench	18”	2
8	Inductive Load	variable	3
9	Capacitive Load	Variable	3
10	Resistive Load box	1φ, 5KW,50Hz, 240V With 10 tumble switches	2
11	Resistive Load box	3φ, 10KW,50Hz, Y-connected, 440V With 10 tumble switches	2
12	Transformer	230V/115-230V, 2KVA	6
13	Transformer	230V/ 0-50%-86.6%-100%, 2KVA	6

E) Electrical Workshop Practice Laboratory

Sl .no	Equipment Name	Specification	Quantity
1	Analog	Analog	2
	Tachometer contact type	0-10000 rpm	
2	4-point starter	5kW,220V	1
3	3-point starter	5HP, 220V	1

(F) ANALOG ELECTRONICS LABORATORY

Sl. No.	Items	Quantity
1	Component Trainer	8
2	Half Wave Full Wave Bridge Rectifier	8
3	FET Characteristics	8
4	Transistor characteristics Trainer (With Meter)	8
5	Emitter follower amplifier	8

6	Differential amplifier	8
7	RC coupled amplifier	8
8	Op-amp comparator-Schmitt trigger	8
9	Op-amp Application Trainer	8
10	Phase Shift Oscillator	8
11	Wein Bridge Oscillator	8
12	Class-B Push pull power amplifier	8
13	Class-AB Push pull power amplifier	8
14	CRO	8
15	Function Generator	8
16	Digital Multi-meter	8

(G) Detail specification of table (F) serially

Sl. No.	Item Name	Specification
1	COMPONENT TRAINER	Analog Component Trainer has been designed in such a way that the studenst can learn about different components .Using this kit the student can learn about various types of resistors, capacitors, inductors, diode, zener diode, transistors. Onboard Resistor Bank: 10ohm, 1Kohm, 3.3Kohm, 220Kohm, 1Mohm • Onboard Capacitor Bank: 0.01uF, 0.1uF, 0.047uF, 10uF, 220uF • Onboard Inductor Bank: 10mH, 22mH, 10uH,20uH • Onboard Photodiode • Onboard LDR • Onboard Photo transistor • Onboard Transistor: NPN CL100 &PNP BC558 • Onboard Diode: IN5408 &IN34 • Onboardzener diode: 3.3V & 5.6 V • Onboard Regulator 7805 for use • Onboard 10K potentiometer • Onboard LED :RED & GREEN • Onboard DIAC • Onboard TRIAC • Onboard SCR • Onboard AC Transformer with taping of 6v,9v,12v • Onboard variable DC supply 1.2v to 12v • One DIP relay with 2 NO & NC contact • Built in Power supply • Onboard LED for power indication • Enclosed in a wooden box • Supplied with user manual and connecting wire
2	Half Wave Full Wave Bridge Rectifier	On board Circuit to Study Half Wave Rectifier On board Circuit to Study Full Wave Rectifier On board Circuit to Study Bridge Rectifier On board Filter ON/OFF switch and LED for power indication. Bare board Tested Glass Epoxy SMOBC PCB is used. Block Description Screen printed on glassy epoxy PCB All interconnections are made using 2mm banana Patch

		cords **Supplied with User manual and patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
3	**FET Characteristics** **Trainer is used to study FET characteristics.**	**On board circuit to study FET characteristics.** **On board variable voltage supply from 0 to -12v** **On board variable voltage supply from 0 to +12v** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used. Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
4	**Transistor characteristics Trainer (With Meter)** **This trainer kit is used to study characteristics of transistor in CB,CE& CC configuration.**	**On board circuit to study transistor characteristics in CB,CE& CC configuration.** **On board two separate variable voltage supply from 0 to +5v** **On Board Digital Voltmeter** **2 On board Digital Ammeter with range selection** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **Supplied with User manual and patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
5	**Emitter follower amplifier** **This trainer kit is used to study emitter follower amplifier using Darlington.**	**On board circuit to study emitter follower amplifier using darlington.** **On board knob for varying amplitude.** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords, Supplied with User manual and patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
6	**Differential amplifier** **This trainer is used to study differential amplifier.**	**On board circuit to study differential amplifier.** **On board switch for input from signal generator.** **On board two inputs. On board two outputs.** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **On board Function Generator 50Hz to 1 MHz (Sine Square Triangle)** **With built-in power supply** **Enclosed in a wooden/plastic box**
7	**RC coupled amplifier** **Trainer is used to study RC coupled amplifier using BJT.**	**On board circuit to study RC coupled amplifier using BJT.** **On board circuit to study amplification in single and double stage.** **ON/OFF switch and LED for power indication. Bare board**

		Tested Glass Epoxy SMOBC PCB is used. **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **On board Function Generator 50Hz to 1 MHz (Sine Square Triangle)** **With built-in power supply** **Enclosed in a wooden/plastic box**
8	**Op-amp comparator-Schmitt trigger** **Trainer is used to study function of op-amp as comparator-Schmitt trigger.**	**On board circuit to study op-amp as comparator-Schmitt trigger.** **On board POT to vary input signal** **On board 2 varying voltage from -12v to +12v** **On board test points to analyse the signal** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
9	**Op-amp Application Trainer** **This trainer is used to study application of operational amplifier.**	**On board circuit to study applications of op-amp.** **Summing** **Addition** **Subtraction** **Integration** **Differentiation** **Inverting amplifier** **Non-inverting amplifier** **Voltage follower** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **Supplied with User manual and patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
10	**Phase Shift Oscillator** **Trainer is used to study the phase shift oscillator.**	**On board circuit to study phase shift oscillator** **Test points are provided to analyse signals at various points** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
11	**WEIN BRIDGE OSCILLATOR** **Trainer is used to study the wein bridge oscillator.**	**On board circuit to study wein bridge Oscillator (using OPAMP).** **On board variable resistance t balance the bridge** **Test points are provided to analyze signals at various points** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords**

		With built-in power supply **Enclosed in a wooden/plastic box**
12	**CLASS B push pull power amplifier Trainer is used to study CLASS B push pull power amplifier.**	**On board circuit to study class-b push pull power amplifier.** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **On board Function Generator 50Hz to 1 MHz (Sine Square Triangle)** **With built-in power supply** **Enclosed in a wooden/plastic box**
13	**CLASS AB push pull amplifier Trainer is used to study CLASS AB push pull amplifier.**	**On board circuit to study class-AB push pull amplifier.** **On board POT for varying amplitude of input signal.** **On board test point to analyze the signal** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **On board Function Generator 50Hz to 1 MHz (Sine Square Triangle)** **With built-in power supply** **Enclosed in a wooden/plastic box**
14	**CATHODE RAY OSCILLOSCOPE (CRO)**	**Dual channel, DC to 30MHz ,Invert facility in both channels** **Vertical Deflection coefficients: 5mV to 20V/div** **Time Base: 20ns,-0.2s/div; Variable Hold-off;X10 Magnification** **Triggering : DC-60Mhz;Active TV Sync sep.; Alternate triggering** **LED indication for stable triggering** **XY mode** **Z modulation** **Saw tooth output (5Vpp approx.)** **Component tester ; 2 level calibrator**
15	**SCIENTIFIC 3Mhz FUNCTION GENERATOR**	**Frequency range 0.3 Hz to 3 MHz** **Digital Frequency** **LCD read out of Sine, Triangular, Square, DC waveforms** **DC offset adjustment** **Trigger output** **Internal sweep & External FM modulation** **Square wave rise time Typ. 40nos** **Distortion Factor <0.5% (up to 100khz)**
16	**DIGITAL MULTIMETER**	**DC Voltage range 0 to 1000V** **AC Voltage range 0 to 750V** **DC current range micro-amp to 10A** **AC current 400uA to 10A** **Selectable unit Resistance range 40Mohm** **Capacitance range 4nF to 200uF** **Frequency 100 to 30 MHz**

(H) DIGITAL ELECTRONICS LABORATORY

Sl. No.	Items	Quantity
1	Logic gate trainer kit	8
2	Adder/Subtractor trainer kit	8

3	BCD to Seven segment converter	8
4	Universal gate trainer	8
5	MUX/DEMUX trainer kit	8
6	Flip-flop trainer	8
7	Shift register and counter trainer	8
8	Synchronous/Asynchronous counter	8
9	Clock generation trainer	8
10	4 bit parallel binary adder/subtractor	8
11	RAM circuit using IC7489	8

Sl. No.	Item Name	Specification
1	Logic gate Trainer (with patch cord) This trainer kit is used to study different types of logic gates.	On board NOT, AND, OR, NAND, XNOR, XOR & NOR gates 5 input switches to give High & Low i/p 5 output LEDs ON/OFF switch and LED for power indication. Bare board Tested Glass Epoxy SMOBC PCB is used. Block Description Screen printed on glassy epoxy PCB All interconnections are made using 2mm banana Patch cords Supplied with User manual and patch cords With built-in power supply Enclosed in a wooden/plastic box
2	Adder / Subtractor Trainer (with patch chord) The trainer kit is used to study Adder and Subtractor.	On board circuit to study Half Adder Full Adder Subtractor On board Low & High inputs On board Output LEDs ON/OFF switch and LED for power indication. Bare board Tested Glass Epoxy SMOBC PCB is used. Block Description Screen printed on glassy epoxy PCB All interconnections are made using 2mm banana Patch cords With built-in power supply Enclosed in a wooden/plastic box
3	BCD to Seven Segment Converter (with patch cord) The trainer is used to study bcd to Seven Segment converters.	On board bcd to Seven Segment circuit. On board high & low input switches On board On board Seven Segment Display ON/OFF switch and LED for power indication. All interconnections are made using 2mm banana Patch cords On board interactive manual using 128x64 Graphical LCD With built-in power supply Enclosed in a wooden/plastic

4	**Universal Gate Trainer (with patch chord)** **The trainer is used to make all the gates using Universal Gates.**	**On board NAND Gate** **On board NOR Gate** **In board Input Switches for High & Low inputs** **On board Output LEDs** **ON/OFF switch and LED for power indication.** **Block Description Screen printed on board** **All interconnections are made using 2mm banana Patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
5	**Multiplexer / De-multiplexer Trainer(with patch cord)** **The Trainer is used to study Multiplexer &De-multiplexer.**	**On board circuit to study 4:1 MUX** **On board circuit to study 1:4 DEMUX** **On board High & Low inputs** **On board Switches for select lines** **On board Output LEDs** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
6	**Flip Flop Trainer(with patch cords)** **The trainer is used to study different types of FLIP-FLOPS.**	**On board circuit to study:** **S-R flip flop** **J-K flip flop** **D-flip flop** **T-flip flop** **Master-slave flip flop** **On board pulsar switch** **On board clear switch** **On board Low & High inputs** **On board Output LEDs** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords** **With built-in power supply** **Enclosed in a wooden/plastic box**
7	**Shift Register and Counter Trainer(with patch cords)** **The trainer is used to study different shift register and ring counter using J-K flip flop and gate.**	**On board circuit to study Left Shift Register** **On board circuit to study Right Shift Register** **On board circuit to study Ring Counter** **On board Low & High input** **On board clear and pulsar switchOn board Output LEDs** **ON/OFF switch and LED for power indication.** **Bare board Tested Glass Epoxy SMOBC PCB is used.** **Block Description Screen printed on glassy epoxy PCB** **All interconnections are made using 2mm banana Patch cords**

		With built-in power supply Enclosed in a wooden/plastic box
8	4 Bit Synchronous/ Asynchronous Counter Trainer(with patch cords) The trainer is used to study asynchronous and synchronous counter using J-K flip flop and gates.	On board circuit to study Synchronous Counter On board circuit to study Asynchronous Counter On board Low & High input On board clear and clock switch On board Output LEDs ON/OFF switch and LED for power indication. Bare board Tested Glass Epoxy SMOBC PCB is used. Block Description Screen printed on glassy epoxy PCB All interconnections are made using 2mm banana Patch cords With built-in power supply Enclosed in a wooden/plastic box.
9	Clock generation Trainer (with patch cords) The trainer is used to study about operation and function of clock generation.	On board 6.144MHz On board 4MHz On board clock output ON/OFF switch and LED for power indication. Bare board Tested Glass Epoxy SMOBC PCB is used. Block Description Screen printed on glassy epoxy PCB All interconnections are made using 2mm banana Patch cords With built-in power supply Enclosed in a wooden/plastic box
10	4-Bit parallel Binary Adder / Subtractor Trainer(with patch cords)	On board circuit to study 4 bit : Adder Subtractor On board switches for Low & High inputs, On board Output LEDs ON/OFF switch and LED for power indication. Bare board Tested Glass Epoxy SMOBC PCB is used. Block Description Screen printed on glassy epoxy PCB All interconnections are made using 2mm banana Patch cords With built-in power supply Enclosed in a wooden/plastic box
11	RAM circuit using IC 7489(16x4 RAM chip) To study and verify the truth table of RAM	Instrument must comprises of DC regulated power supply 5V DC/150mA, 16 logic inputs selectable using SPDT switches . 4 LED output indicators.

(I)Microprocessor LABORATORY

Sl. No.	Items	Quantity
1	8086 Microprocessor kit	8
2	8051 Micro Controller Kit	8
3	Traffic Light Controller interfacing module	8
4	Stepper Motor Controller interfacing module	8

5	ADC Module	8
6	Relay Opto Module	5
7	Real time clock module	5
8	Raspberry Pi 4 with 4 GB RAM	2

Sl. No.	Item Name	Specification
1	8086 Microprocessor kit	Microprocessor based Training Kit with Display and IBM / PC keyboard, On Board Assembler & Dissembler Based on Intel's 8086/8088 CPU @ 20 MHz. Compatible with 8088 Microprocessor (8 bit) Provision to add 8087 Co-processor & 8089 I/O Processor. 64 KB of CMOS RAM expandable to 128 KB using 62256 128 KB of EPROM loaded with monitor expandable further using 27010. Battery Backup for RAM. Total on Board memory expansion to 384 KB. 24 programmable I/O lines through8255. Expandable to 48 lines. Real time Clock interfaces. Three 16-bit Timer/Counter through 8253. RS 232C serial interface through 8251. 8 different level of interrupt through 8259. 1 Mask able interrupts. 8 Non-Mask able interrupt On board 128x64 Graphical LCD with 8 Line 104 Keys IBM Compatible Key Board.(USB) Two modes of Commands key board mode and serial mode. All address data and control lines available at FRC connector as per multi Bus. Facility for Down/Up loading files from /to PC. With Built in Power Supply.
2	8051 Micro Controller Kit	Based On Intel's 8051Micro Controller having following specifications: 8051 Micro controller (8 bit), operating at 20 MHz crystal frequency. 32k Bytes of EPROM loaded with Monitor program 32K Bytes of RAM available to the user 16K /8K Bytes of Scratch pad Ram. Total on board memory expansion to 64K bytes using 27512/62256 with 3 sockets of 28 pin Memory mapping definable by the user. 24 Programmable I/O lines through 8255.Expandable to 48 Three 16 bit Timers/counters through 8253. 8251 for RS232C interface for CRT/PC On Board Interrupt Controller using 8259 On Board Real Time Clock

		On Board Battery Back Up for RAM **All address, data & control lines are available at 50 Pin FRC connector.** **On board 128x64 Graphical LCD with 8 Line** **IBM PC/AT Compatible ASCII Keyboard** **On Board Assembler / Disassembler** **Powerful software commands.** **Down/Up loading of files from/to PC.** **Built in Power Supply**
3	**Interfacing module for the 8085, 8086 & 8051 Kits** **Traffic Light Controller** **Stepper Motor Controller** **ADC Module** **Relay Opto Module** **Real Time clock Module**	**On board Traffic intersection** **On board Green Yellow & Red LEDs for Each Crossing On board timer/Counter 7 Segment based for monitoring the time between different states** **On board 360 Dial On board Pointer On board Built in power Supply Provision to change Speed, Direction & steps On board 0 -5 V Supply for Analog Input** **On board 8 LEDs for Digital Output 8 Channel ADC** **On board switches for Channel Selection(3 Switches- Toggle) On board Fault generation Facility Onboard Relay On board Opto isolated input On board Fault generation Facility On board RTC chip On board 7 segment display for Hour, Minute and Second**
4	**Raspberry Pi 4 with 4 GB RAM**	**Mini HDMI to HDMI Convertor** **- HDMI to VGA Convertor** **- 16GB Class 10 micro SD Card (SanDisk)** **- 5v @ 3A Power Adaptor** **- Card reader** **- Casing for Pi**

INDIRA GANDHI INSTITUTE OF TECHNOLOGY, SARANG

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ANNEXURE- VI

(Equipments for the Department of Mechanical Engineering)

Sl. No.	Name of Lab	name of Instrument	Quantity	Specification
1	Dynamics Lab	Parallel force apparatus	2	Simple supported beam type, thrust type-compression minimum 10 kg, weight- 500 gm (2 nos), 1 kg (2 no's), 2 kg (2 no's)
2	Dynamics Lab	Journal bearing Apparatus	1	Scope of Experiment (minimum) : To measure frictional torque and power transmit, To study the pressure profile of lubricating oil at various conditions of load and speed, Bench area- 1.5 X 1.5 X 4 m, supply- 230V AC, single phase, variable speed motor (FHP type preferable), tubes- 12 or higher, oil- SAE 40 (to be supplied initially 5 Litre minimum), Manometer, Bearing Diameter- 55 mm, adjustable weights- 4 or more, Journal diameter- 50 mm, panel should be provided for motor speed control, Automation type- Semi automatic or automatic
3	Heat transfer lab	Emissivity measurement apparatus	1	Electricity Supply: 1 Phase, 220 V AC, 50 Hz, 5-15 amp combined socket with earth connection (Earth voltage should be less than 5 volts), Table for set up support, Heater type- wire type
4	I C Engine Lab	Morse Test on CI Engine Test Rig	1	No of cylinder-4, No of strokes-4, Engine type-Diesel run (Fuel injection type), cooling type-water cooled, Speed- 1500 rpm or higher, Output-10 hp or higher, dynamometer- eddy current type with air cooling
5	I C Engine Lab	Single cylinder 2 stroke petrol engine	1	Single cylinder, cooling type-air cooled, dynamometer- eddy current type, speed- 3000 rpm or higher, output - 2.5 hp, Mechanical rope brake dynamometer
6	Material Testing Lab	Vickers hardness testing Machine	1	Computerized micro Vickers hardness tester: The vendor should supply fully automatic hardness instrument for loading, dwelling and unloading of the analyzing sample with the following specifications: Test load range-1gf to 1000gf with automatic loading mechanism (at least 8 to 10 steps load range should be covering above mentioned loads.) Loading speed: Hardness testing scale-HV, Knoop Hardness value range- up to 3000HV(minimum) Duration time-1 to 99s Magnification of microscope-The measuring system should have the at least 400X magnification for measuring and at least 100X for

				observation with enhance high resolution reading. Microscope objectives should have better resolution. Measuring unit- The instrument should have a minimum 0.025µm measuring unit or better. XY stage-The dimension of the testing table should be close to 100x100mm and maximum moving range of the X-Y testing table should be close to 25x25mm. Source of Illumination: - Halogen lamp 20W or better with intensity control facility (Alternatively LED illuminator of suitable intensity would be acceptable). Attachment for Image Viewing & Measurement Analysis: (i)Branded color camera (high resolution) with adapter/interface attached to micro hardness tester & compatible with the latest configuration computer system. (ii)Image processing Software for both method of testing (Knoop &Microvickers) working on latest OS (Windows 7 or 8) for automatic hardness measurement. (iii)Processing software should be calibrated through standard scale. (iv)Software should have statistical data analysis, image enhancement, precise measurement of diagonal lengths, and manual measurement of hardness, case depth measurement, automatically conversion of hardness values, length measurement, Report generation MS- Excel or MS Word format. (v) Branded computer configuration minimum of Intel i5 processor, 4Gb RAM, 500Gb HDD, DVD-RW, I9 inch LED monitor, Keyboard, and Mouse. (vi) Branded Color LaserJet printer for A4 size printing having min. resolution of 600Dpi. (vii) Branded Online 1KVA UPS of minimum of 30 minutes power back up. Standard accessories- Objective lens 10x,40/50x,80/100x along with eyepiece, specimen clamping device, dimond pyramid indenter (2nos.),standard test block, supply cord, PC interface cable, Micro Vickers software CD, operational/ instruction manual and maintenance manual along with detailed electronics circuit drawings/specifications, accessory box and other required accessories to operate and conducting the hardness testing.
7	Material Testing Lab	Universal hardness tester	1	Rockwell, brinell, vickers hardness test

8	Material Testing Lab	Fatigue Testing Machine	1	Material- Mild steel, Supply- 440V, 3 phase, 50/60 Hz, display type- digital
9	Material Testing Lab	scratch hardness tester	1	Weight-1.5 kg, single phase, 220V, 50/60 Hz, finishing-powder coated
10	Material Testing Lab	Strain rosette apparatus (digital)- 5 channel rosette starin gauge with digital indicator	1	
11	Material Testing Lab	Torsion testing machine (digital)	1	supply- 415V, 3 phase, 50/60 Hz, torsional speed- 0.1/0.2 rpm
12	metrology Lab	Digital Planimeter	1	measuring range-vertical width 300 mm or higher, horizontal roller rotating length 30 m, accuracy 0.02%
13	metrology Lab	Ultrasonic flaw detector	1	display type- digital, bandwidth- 0.5 to 20 MHz with wide band amplifier, gain- 0 to 80 dB (selectable range to be provided), operating mode- single probe, double probe, test mode- pulse reflection or pulse transmission, probe connector- BNC type, vertical linearity- ±2.5%, probe zero-0 to 99.99 mm
14	metrology Lab	Sin bar	2 Set	range 150 mm, 200 mm, 250-350 mm
15	metrology Lab	Roundness checking	1	Mitutai make, probe-stylus type with magnetic stand with universal fixture
16	RAC Lab	Vapor Compression Test Rig	1	*
17	Thermal lab	Marcet Boiler	1	Supply- 230V AC, 50/60 Hz, single phase, measuring pressure range- 0 to 20 bar, measuring temperature range- 0 to 200°C, stain less steel, capacity- 2 litre or higher, Heater- 1.5 kW or higher
18	Thermal lab	Steam Bench	1	Stainless steel, frame type- bench top, operating range- 0 to 250°C, supporting control panel, water circulation provision
19	Thermal lab	Flash point and Fire Point Apparatus	1	Supply-230V AC, single phase, power- 1kW or higher, heater- coil type rapid heating, cooling- forced air cooling (centrifugal blower), ignition- stepper motor controlled movement with electric igniter, methods- ASTM D92A, ISO 2592 (P:69), IP 36, measurement range- 0 to 400°C (or higher), automatic flame extinguisher, digital temperature sensor, flash detector, fire detector
20	Thermal lab	Joule's Apparatus	1	stainless steel and wood, weight- 5 gm (10 no's), 100 gm (5 no's)
21	Production Lab	EDM drilling	1	Numerically controlled, vertical quill EDM

		machine		drilling machine
22	Production Lab	Lathe tool dynamometer	1	Strain gauge type, 3 channel, Range-0 to 200 kg, least count- 1 kg
23	Production Lab	Drill tool dynamometer	1	computer support with software, Strain gauge type, 2 to 3 channel, Range-0 to 200 kg, least count- 1 kg
24	Metrology Lab	Computerized Coordinate measuring machine with CAD software	1	Display resolution- 0.0005 mm, x axis-433 mm, y axis-300 mm, z axis-400 mm
25	Dynamics Lab	Coriolis Component of Acceleration Apparatus	1	1. Reservoir Tank: SS -304 2. Rotating Arms: 9mm/6mm orifice diameter, Length 300 mm. 3. Rota meter: 250 to 2500 LPH 4. Drive: Variable speed FHP motor, PMDC type 5. Pump: 0.5 HP for water circulation. 6. Control Panel Comprises of : RPM measurement : RPM Indicator with Proximity sensor. 7. Variac, Standard make On/Off Switch, Mains Indicator, etc.
26	Dynamics Lab	Spring constant under tension and compression	1	Model / Capacity: UST-RP-100 Maximum Capacity: 100 kg / 1000 N Type of Spring: Tension & Compression Free length of tension spring: 100 mm Diameter of compression spring: 80 mm Maximum Cross Head Travel-without sample/grip: 100 mm Force Measuring Resolution: 0.02 kg (20 gms)/0.2 N **Grip:** Compression Plate: 80 mm (1set – 2Nos.) Tension Grip / Hook Optional Elongation Measurement: Dial gauge with a least count of 0.01 mm
27	Thermal lab	Bourden tube pressure gauge	1 each	6", 0 to 200 psi, 4", 0 to 100 psi, 2", 0 to 50 psi
28	Thermal Lab	ultrasonic cleaner	1	230V AC, single-phase, 50 Hz, capacity- 5 litrs
29	Production lab	Tool makers microscope	1	optical tube-monocular type, magnification- 30x, 75x, 150x, digital camera and computer interface (optional), standard eye piece 10x or 15x, objective- min 2x,
30	Office and Library	scrolling information display board	4	Led display type-single, pitch- max 10 mm, led colourr-Red, size- 150 X 900 mm (minimum)

ANNEXURE- VII

(Equipments for Department of Electronics & Telecommunication Engineering)

1. MEASURING INSRUMENTS for COMMUNICATION LAB

Sl. No.	Instruments	Series	Features	Quantity
1	Spectrum Analyzer	SSA3032X (9 KHz ~ 3.2 GHz)	All digital IF technology. Frequency range from 9 KHz up to 3.2 GHz.-161 dBm /Hz display average noise level (Type). -98 dBc/ Hz @ 10 KHz offset phase noise (1 GHz, Type). Total amplitude accuracy < 0.7 dB.1 Hz minimum resolution bandwidth (RBW). 10.1 ich WVGA (1024*600) display.	02

2. VLSI DESIGN LABORATORY

Sl. No.	Name of the Equipment	Specification	Quantity
1.	Xilinx Vivado system edition software	license: 25 user Version: Latest	1
2.	Xilinx Development Board	Zynq™-7000- Zed Board	5
3.	Pmod Development kit for FPGA	Pmod AD1-12 bit A to D Converter Pmod AD2-4 channel 12 bit ADC Pmod AD5-24bit ADC Pmod DA1-8 bit DAC Pmod DA2-12 bit DAC Pmod DA3-16 bit DAC Pmod DA4-8 channel 12 bit DAC	1

3. NETWORK DEVICE LAB

Sl. No.	Name of the Equipment	Specification	Quantity
1	Experimentation with transient analysis of RC/RL circuits	DC power supply + 5V Mains supply 230V±10%, 50HZ On board RC and RL circuit Built in single generator	02

4. ELECTRICAL & ELECTRONICS MEASUREMENT LABORATORY

Sl. No.	Name of the Equipment	Specification	Quantity
1	Ballistic Galvanometer set up	Suspension wire : phosphor, bronze Reflector : concave mirror Coil resistance 100 Ω Lamp : LASER light source Supply voltage 6 V Potentiometer 5 KΩ Mains supply 230V ± 10%, 50 HZ Fuse 0.5mA	01

5. ELECTROMAGNETIC ENGINEERING LAB

Sl. No.	Description	Quantity
1.	ANSYS HFSS SUITE (Teaching License)	05 Users License

6. Matlab Software unlimited campus license for 3 years

Annexure-VIII

(Equipments for Department of Metallurgy and Materials Engineering)

SL NO	Name of the equipment	Specification	Quantity
1	Thermocouples :- Chromel - alumel (K-Type)	Sensitivity of approximately 41µV/°C1, temperature measurement: -200°C to +1260°C.	1
2	Thermocouples :- Chromel – constantan (K-Type)	Sensitivity of approximately 41µV/°C1, temperature measurement: -200°C to +1260°C.	1
3	Muffle Furnace :- 14000C	Maximum Hot Case temperature (Degree in C): 1600°C,Carbolite Gero 301 controller, with single ramp to set-point & process timer, chamber volumes: 8 litre, Vertical lift door keeps heated surface away from the user, Soft closing door, Silicon carbide heating elements provide long life and are able to withstand the stresses of intermittent operation, Heat-up time (minutes) 46 Dimensions: Internal H x W x D (mm) 220 x 220 x 310 Dimensions: External H x W x D (mm) H (door open) 810 x 690 x 780 (1105), Configuration Bench-top, Max power (W) 10000, Holding power (W) 3000, Thermocouple type R, Power supply required:- 200-240V, 3 phase	1
4	Thermocouples :- Platinum – Rhodium (Pt – Rh)	R,S,B,C Type Thermocouple, Up to 1700 Degree C, Class 1,Wire: 0.50 mm,0.45 mm,0.40 mm,0.35 mm,0.30 mm,0.28 mm	1
5	Induction Melting furnace for cast iron	Tmax 1500 °C, Crucible sizes of 1.5 liters Crucible with integrated pouring spout of iso-graphite included with delivery Additional spout mounted at the furnace for exact pouring, Compact bench-top design, simple emptying of crucible by tilting system with gas damper, Crucible for heating up of melting furnace insulated with a hinged lid, lid opened when pouring, Defined application within the constraints of	1

		the operating instructions, Over-temperature limiter for the furnace chamber with automatic reset to protect against over temperature, Observation hole for melt, Outer dimensions:W580xD630xH580, connected load:10.5KW, 3 phase	
6	Mould Hardness Tester	Versatile brand, Expansion: 125 Millimeters,	1
7	Rod cutting m/c (Industrial)	Max. Steel Bar Dia: 6-40 mm	1
8	Permeability Tester (Permeability Manometer)	With Air Tank, Water Tank, Manometer Unit, Permeability Chart, 2 Orifices and Syphon Unit	1
9	Hot plate (3000C)	Material: Cast Iron, Voltage: 230 V, Temperature Range: Ambient to 350 Deg C, Power: 2500 W	1
10	Graphite crucible 5 kg	Min inside Diameter: 70 mm, Color: Grey, Material: Pure Graphite, Min Height: 73 mm, Max Height: 149mm	2
11	Hot mounting m/c	Frequency: 50-60Hz, Model: VE-Mount 01, Voltage: 220- 380V, Temperature Range: 0 - 200 Degree Celsius, Mould Diameter: 22 mm, 30 mm or 45 mm	1
12	Dryer(1000 and 1500 watt)	Voltage: AC 220 V / 50-60 Hz	2