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| logo1COLLEGE OF ENGINEERING AND TECHNOLOGYTECHNO CAMPUS, GHATIKIA, BHUBANESWAR-751 003 |

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| No. 3596 / CET; Dated 06/10/2016 |

**TENDER CALL NOTICE**

Sealed tenders are invited from reputed Original Equipment Manufacturers/Authorized Dealer up to the date mentioned in the tenders for supply and installation of equipment for (a) Hydraulic Machines Lab. (b) Environmental Engg. Lab. of Department of Civil Engineering. The date of opening the various tender is mentioned in the respective tender document, which will be opened in the office of the Principal, College of Engineering and Technology, Bhubaneswar in the presence of bidders and/or their authorized representatives. The sealed tender will be received by Speed Post/Registered Post /Courier only. No hand delivery is acceptable. Tender received after the scheduled date and time will not be considered. The authority is not responsible for any postal/courier delay. The tender bid documents with details of terms and conditions are to be downloaded from the College Website: [**www.cet.edu.in**](http://www.cet.edu.in)**.**

More details are available at our college website **www.*cet.edu.in***.

The authority reserves the right to reject/cancel the tenders in whole or in part without assigning any reason thereof.

 **Sd/-**

 **PRINCIPAL**

**Bid Ref no. 3596/CET Date:06.10.2016**

**BIDDING DOCUMENTS AND INSTRUCTION TO SUPPLY EQUIPMENT**

**FOR**

**HYDRAULIC MACHINES LABORATORY**

**OF**

**DEPARTMENT OF CIVIL ENGINEERING**

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**COLLEGE OF ENGINEERING AND TECHNOLOGY**

**(A Constituent College of Biju Patnaik University of Technology)**

**Techno Campus,Ghatilia, Bhubaneswar – 751 029**

**INVITATION FOR BIDS**

 **Principal, College of Engineering & Technology**, Bhubaneswar invites sealed bids from eligible bidders for supply of machineries/equipment to Department of Civil Engineering.

 Interested eligible Bidders may obtain detail information and list of items with technical specifications from **the website of the College** [**www.**](http://www.nitdgp.ac.in)**cet.edu.in**

 Particulars about submission of bidding document are as follows:

(a) Price of bidding document : **Rs. 230/-(service tax is included)**

(non-refundable)

(b) First date of availability of Bidding

 Document in the website : 06**.10.2016**

(c) Last date and time for submission of bids: **07.11.2016 at 1.00 P.M.**

(d) Time and date of opening of bids : **07.11.2016 at 3.00 P.M.**

(e) Place of opening of bids : **Principal Office**

 **College of Engineering & Technology Techno-Campus,Ghatikia, Bhubaneswar-751003**

(f) Address for communication : **Principal/Head of Dept.( Civil Engg.)**

 **College of Engineering & Technology**

 **Techno-Campus, Ghatikia,**

 **Bhubaneswar-751003**

Sd/-

 **Principal**

### Eligibility of Tenderer and General Instructions:

###  1.1 Eligibility:

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

* + 1. The tenderer should be a reputed Original Manufacturer, who should provide the documents relating to their **Manufacturing Capabilities** as follows**.**
	1. The Company should be registered with NSIC/SSI.
	2. Annual turn-over of the company should be more than Rs. One Crore for at least last three consecutive years.
	3. The company must have cleared Sales 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 PAN Number must be enclosed along with the Tender documents.
	4. All after sales support should be provided directly by the manufacturer only.
	5. The tenderer must have the willingness for providing comprehensive maintenance support of the Machine supplied by him.
	6. The tenderer must provide evidence of successful execution of supply orders with installation and successful after sales support in reputed organizations like NITs/IITs/Central Research Laboratories.
	7. The selection of the successful tenderer may be based on the verification of their manufacturing unit by the technical committee members, if required.

1.1.2 If for any equipment minimum no. of tenderers would not have the eligibility criteria as mentioned in para 1.1.1 (a to g), then department may consider to procure those equipment from the authorized dealer with only the following eligibility criteria under para 1.1.2 (a to e)

* 1. If the tenderer is an Authorised Dealer of Manufacturer, necessary certificate to this effect from his Manufacturer must be enclosed.
	2. All after sales support should be provided directly by the Manufacturer only.
	3. The Manufacturer must have the willingness for providing comprehensive maintenance support of the Machine supplied by him.
	4. The tenderer must provide evidence of successful execution of supply orders with installation and successful after sales support in reputed organizations.
	5. The tenderer must have cleared Sales 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 PAN Number must be enclosed along with the Tender documents.

###  1.2 General Instructions:

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

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

The tender should mention in the tender paper, the location of its service centre nearest to Bhubaneswar.

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

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

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

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

Request from tenderer in respect of additions, alterations, modifications, corrections, etc. of either terms & conditions or rate after opening of the bid may not be considered. However, negotiation may be made before finalization.

Tenderers shall carefully examine the bid documents and fully inform themselves of all the conditions, which may in any way affect the work of the cost thereof.

Should a tenderer find discrepancies or omissions from the specification or other documents and any doubt as to their meaning, he should at once notify the purchaser and obtain clarification in writing.

This, however, does not entitle the tenderer to ask for time beyond the due date fixed for receipt of tenders.

The tenderer must also specify minimum time and maximum time to repair/replace in the event of a failure and penalty there of.

Verbal clarification and/or information given by the purchaser or its employees or representatives shall not be binding on the purchaser.

Submission of sealed bid will carry with the implication that the tenderer agrees to abide by the conditions laid down in the detailed particulars of the bid notice.

Conditional offers and offers qualified by vague and indefinite expression, as ‘subject to immediate acceptance’ ‘subject to prior sale’, etc. will not be considered.

While tenders are under consideration, tenderers and their representatives or other interested parties are advised to refrain from contacting by any means, to the purchaser's personnel or representatives on matter relating to the tenders under study.

The purchaser, if necessary, will obtain clarification on tenders by requesting such information from any or all the tenderers either in writing or through personal contact as may be necessary.

The tenderer will not be permitted to change the substance of his offer after the tenders have been opened.

In the event of non-compliance with this provision, the tenderer is liable to be disqualified.

###  1.3 Procedure for Submission of Tenders:

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

**Part-I (Technical Bid)**

Excepting the price schedule, all other documents as mentioned in para 1.1 i.e details of technical specifications, leaflet, Copy of Firm Registration Certificate from the competent authorities, Sale Tax clearance, Income Tax Clearance, PAN Card copy, list of clients, authorization certificate from Manufacturer in case of Dealer, etc. along with tender document duly signed by the authorised person in each page shall be covered in Part-I (Technical Bid).

**Part-II (Price Bid)**

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

#### b) Both sealed covers Part-I **“ Technical Bid”** and Part-II “Price Bid” should be placed in a third cover along with requisite **EMD & cost of Tender documents** (separately in the form of DD drawn in favour of **Principal, College of Engineering & Technology, Bhubaneswar** at any Nationalized Bank payable at Bhubaneswar) , others requisite supporting documents etc. and sealed. The sealed cover containing tender documents as per procedure indicated above should be submitted to the Principal, College of Engineering & Technology, Techno-campus,Ghatikia, Kalinga Nagar, Bhubaneswar-751003 **within the due date and time as stipulated in Tender. The sealed envelope must show the name of the tenderer and his address and should be super scribed as “*Tender for supply of Equipment for Hydraulic Machines Lab. of Civil Engineering Department****”* **on the top of the envelope**.

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

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

### Requirements by Tenderer before Supply:

###  2.1 Rating Plate, Name Plate and Labels:

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

### 2.2 Packaging:

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

###  2.3. Inspection:

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.

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

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

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

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

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

###  2.4. Environmental Condition:

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

\* Storage Temperature 0 to 70 degree Celsius

\* Operating Temperature 0 to 50 degree Celsius

\* Humidity 95% RH (non-condensing)

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

### Requirements by Tender after Supply:

###  3.1 Supply:

The material would be delivered by the supplier at CET, TECHNO CAMPUS, Ghatikia, Bhubaneswar – 751003, Odisha.

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

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

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

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

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

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

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

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

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

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

Imported consignment, if any, should be destined to CET, Techno Campus, Kalinga Nagar, Ghatikia, Bhubaneswar – 751003, Odisha, India through Bhubaneswar Air Port.

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

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

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

### 3.2 Installation and Commissioning:

Installation and Commissioning shall include the following:

1. Installation and Testing of the Equipment, Machineries etc. should be supplied by the tenderer.
2. It will be the responsibility of the tenderer to provide all necessary spares and consumables, which may be required during installation and commissioning, at no extra cost to purchaser.
3. The tenderer is to bring their own testing and measuring instruments required for installation, testing, commissioning, which can be taken back after completion.
4. Installation must complete within 15 days after delivery on site.
5. The tenderer should provide all necessary raw materials for running of the machine during commissioning.

### 3.3 Documentation:

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.

Supplied manuals/handbooks must cover detailed technical specifications and installation, operation, maintenance and System Safety procedures.

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.

The receipts for taxes paid, if any, for the supplied materials should also be submitted

### 3.4 Trial Operation and Performance Guarantee Test:

After successful completion of Installation and Commissioning of the equipment, a 7-day continuous trial operation putting those on optimum use shall be conducted by the tenderer at site, during which the performance of the equipment shall be demonstrated for trouble-free continuous operation, meeting the specified standards and proper training shall be imparted to two persons of the purchaser.

During trial operation, tenderer shall do all necessary adjustments required to ensure the performance as per the acceptable level.

In case, guaranteed performance is not established, the tenderer shall be given opportunity to rectify/replace the equipment/components, and restart the 7 days continuous trial operation, at the risk and cost of the tenderer.

### 3.5 On-Site Warranty:

1. 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.
2. During the period of warranty, it shall be the responsibility of the tenderer to provide all essential spares and consumables, which may be required for maintenance and trouble-free operation of the devices / components at the tenderer’s cost.
3. Software, if any, has to be tested with at least one-year warranty for trouble free operation.

### 3.6 Comprehensive Maintenance Contract:

The tenderer shall be under the obligation of entering into a Comprehensive Maintenance Contract (CMC) with CET 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.

The scope of CMC shall cover maintenance and supply/replacement of materials and components, for smooth and reliable operation of the systems without trouble.

Accordingly, the tenderer has to offer rates for the CMC structure per equipment along with the price for the Systems and other associated Equipment supplied.

### 3.7 After Sales Service:

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

For any problem reported the tenderer shall attend and rectify the problem within 7 (seven) days or provide a stand by system of the similar configuration.

The report on any problem will be informed through phone or fax number of which shall be given by the tenderer.

The branch office of the concerned manufacturing firm will be fully responsible to provide maintenance service, in case of any negligence, in providing the service by the tenderer.

On failure to comply with those instructions, the Bank Guarantee provided for the warranty period shall be invoked.

### Financial Terms:

**4.1 EMD**

The tenderer has to submit a Demand Draft / Banker’s Cheque / Pay order of **Rs.9,500/ - in favour of Principal, College of Engineering and Technology, Bhubaneswar** payable at Bhubaneswar in any Nationalised Bank towards EMD.

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

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

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

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

**4.2 Performance Security Deposit**

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

**4.3 PRICES:**

Price quoted should be **FOR College of Engineering & Technology, Bhubaneswar only. Tax components as applicable should be mentioned clearly in the financial bid.**

Price should be quoted for unit item.

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.

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

**4.4 Sales Tax Concession:**

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

**4.5 Discount:**

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.

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

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

**4.6 Payments:**

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

**4.7** In case of purchase in Indian Rupees, payment of 100 percent of the ordered value will be made after successful installation and commissioning of the equipment subject to submission of satisfactory performance report by the concerned Head of Department

**4.8 Penalty:**

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

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

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

### Instruction to the Tenderer:

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

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

Otherwise, model with higher specification should be in addition to the model with minimum specifications.

Specify brand name and full model name and number for each offer.

Include the printed catalogue and pricelist if any for each of the equipment quoted.

Specify the list of Accessories required along with each of the equipment.

Quote the additional price of the accessories; only those, which are fully compatible with the quoted model, should be furnished.

Specify the list of Accessories to be given free of cost, along with the equipment as “**Free Accessories”**; these should be fully compatible with the quoted models.

**5.1 Solving Disputes:**

CET, the tenderer and the manufacturer shall make all efforts to resolve amicably by direct informal negotiation on any disagreement or dispute arising between them under or in connection with this contract.

All disputes arising out of the contract shall be referred to courts under the jurisdiction of the Bhubaneswar court only.

***The above terms and conditions except those otherwise agreed upon, shall form a part of the Purchase Order***.

***Sign on each page of this tender document and Return it along with the offer enclosing this part together with the Technical Offer.***

***\*\* \* The CET authority has all rights to accept / reject any tender without assigning any reasons there of.***

### Technical Specifications:

Following are the minimum specifications of the equipment.

The minimum specifications are indicative and not exhaustive.

The models with higher specifications may be quoted.

The quoted materials should be of latest trend and technology.

Each equipment should be complete in itself without needing any extra requirements except the requirement of general test and measuring instruments.

**List of equipment with technical specification required for Hydraulic Machines Lab. of Civil Engineering Department:**

|  |  |  |
| --- | --- | --- |
| **Sl.****No.** | **Specifications** | **Nos. Required** |
| **1** | **Pelton Wheel Turbine setup**Capacity : 2 HPRated Speed : 1000 RPMDischarge : 400 LPMSupply Head : 40 Mts.Buckets : Gun MetalCasing : Grey Cast IronShaft : High Carbon SteelType : ImpulseSupply Pump Size : 2.5” x 2’Total Head : 45 MtrsMotor Capacity : 7.5 HPStarter : Dol/ Star DeltaFlow Measurement : VenturimeterSize : 50mmMaterial of Construction : CI Body with Brass liningPressure Measurement : Pressure Gauge.Speed Measurement : Digital RPM indicator.Sump Tank : SSLoading : Rope BrakeDrum Diameter : 200mm | 01 |
| **2** | **Francis Turbine setup**Capacity : 2 HPRated Speed : 1000 RPMDischarge : 900 LPMSupply Head : 20 Mtrs.Buckets : Gun MetalCasing : Grey Cast IronShaft : High Carbon SteelType : ReactionSupply Head :Size : 3” X 2.5”Discharge : 900 LPMTotal Head : 25 MtrsMotor Capacity : 7.5 HPStarter : DOL/ Star DeltaFlow Measurement :Measuring Instrument : VenturimeterSize : 65mmMaterial of Construction : CI Body with Brass liningPressure Measurement : Measuring Instruments : Pressure GaugeSpeed Measurement : Measuring Instrument : Digital RPM indicatorSump Tank : Material : SSLoading Type : Rope Brake Drum Diameter : 200 mm | 01 |
| **3** | **Centrifugal Pump Test setup**PUMP : Centrifugal Pump of size 25 mm at 10 m total head when run at maximum speed. (Make: Kirloskar).MOTOR : 01 HP, 2880 RPM, 1Phase, 220 V, AC Supply SPEED VARIATION : Stepped pulley “V” belt drive to run the pump at 3 different speeds.ELECTRICAL PANEL:Energy meter for the measurement of input power.Measuring Tank : M.S with EPOXY coating or stainless steel of size 0.3 x 0.3 x 0.5m with control valve, Piezometer with scale and an overflow arrangementSUMP TANK : stainless steel of size 0.7 x0.7x0.4 m for storage of water to circulate Through experimental unit.OTHERS : Piping system consisting of Pipes, Pressure relief valve, Gate Valve and fitting with Pressure gauge. | 01 |
| **4.** | **2 HP KAPLAN TURBINE Set up** Capacity : 2 HPRated Speed : 1000 RPMDischarge : 1500 LPMSupply Head : 8 Mtrs.Buckets : Gun MetalCasing : Grey Cast IronShaft : High Carbon SteelType : ReactionSupply Pump :Size : 5” x 5”Discharge : 1500 LPMTotal Head : 10 Mtrs.Motor Capacity : 7.5 HPStarter : DOL/Star DeltaFlow Measurement : Measuring Instrument : VenturimeterSize : 125mmMaterial of Construction : CI Body with Brass liningPressure Measurement : Measuring Instrument : Pressure Gauge.Speed Measurement : Measuring Instrument : Digital RPM indicatorSump Tank : Material : SS/MS with FRP liningLoading :Type : Rope Brake Drum Diameter : 200mm | 1 |

**Scope of Experiments:-**

**1. Closed Circuit Pelton Wheel Turbine Test Rig \_- 02 HP :**

AIM :To determine the efficiency of a Pelton Turbine and to plot its characteristic curves

**EXPERIMENT :** input power to the turbine

 Out put power of turbine

 Effiency of turbine

Main characteristic curves: subject to capacity

Discharge v/s speed

Power input v/s speed

Efficiency v/s speed

Operating characteristic curves: subject to capacity

Power input v/s discharge

Efficiency v/s power input

Efficiency v/s discharge

1. **Closed Circuit Kaplan (vertical type ) Turbine Test Rig - 02 HP :**

AIM :To determine the efficiency of a Pelton Turbine and to plot its characteristic curves

**EXPERIMENT** : input power to the turbine

 Out put power of turbine

 Effiency of turbine

Main characteristic curves: subject to capacity

 Head v/s Discharge

 Power input v/s Discharge

 Efficiency v/s Discharge

Operating characteristic curves: subject to capacity

 Power input, Head, Efficiency v/s discharge

Power input, Head, Discharge v/s speed

1. **Closed Circuit Francis Turbine Test Rig - 02 HP :**

AIM : To determine the efficiency of a Francis Turbine and to plot its characteristic curves

EXPERIMENT : input power to the turbine

 Out put power of turbine

 Effiency of turbine

Main characteristic curves: subject to capacity

 Head v/s Discharge

Power input v/s Discharge

Efficiency v/s Discharge

Operating characteristic curves: subject to capacity

 Power input, Head, Efficiency v/s discharge

Power input, Head, Discharge v/s speed

 **4 . Closed Circuit Single Stage Multispeed Centrifugal Pump Test Rig - 01 Hp**

Objective: - To obtain the performance characteristics of a Centrifugal pump and to Determine its specific speed

**Note: The supplier is to depute a trainer to train the faculty-in-charge and interested faculty of the department for two days about the above equipment by doing the experiments for all the above scope of experiments. The trainer should have sufficient theoretical knowledge about the equipment.**