TENDER

for

Supply, Erection & Commissioning of

"Pump Testing Lab facilities
&
Induction Motor Testing Lab facilities"

Tender No. NTSC(C)/EC/LAB-1/14-15

Issued By

NSIC TECHNICAL SERVICES CENTRE,
THE NATIONAL SMALL INDUSTRIES CORPORATION LTD.,
(A GOVT. OF INDIA ENTERPRISE)
SECTOR B-24, GUINDY INDUSTRIAL ESTATE
EKKADUTHANGAL, CHENNAI – 600 032.

Tel: 044-22252335/6/7 Fax: 044-22254500
Email: ntscche@nsic.co.in Website: www.nsic.co.in

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NSIC
ISO 9001 : 2008

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NOTICE INVITING TENDER

Sealed tenders are hereby invited on behalf of the Chief General Manager, NSIC Technical Services Centre (Chennai), Sector B-24, Guindy Industrial Estate Ekkaduthangal, Chennai – 600 032 from the reputed manufacturers/ firms/ companies who are interested for Supply, Erection & Commissioning of pump testing lab facility& induction motor testing lab facility as per specifications at Annexure – A & B, so as to reach to Chief General Manager, NSIC-Technical Services Centre (Chennai), Sector B-24, Guindy Industrial Estate Ekkaduthangal, Chennai – 600 032 upto **4 PM. on 30/06/2014.** The details as summarized below:-

a)	Name of the Machines and equipments	As per Annexure-A & B
b)	Earnest Money Deposit	5% of the quoted price which should be **rounded off** to the **nearest Rs.500 on higher sides**. (Example: if calculated **EMD is Rs.501 then Rs.1000/- is to be deposited as EMD**).
c)	Cost of Tender Document	Rs. 1000/- plus service charges (non-refundable)
d)	System of Tender Document	Two bid system – Technical Bid and Financial Bid separately in two sealed covers superscribing "TECHNICAL BID FOR SUPPLY, ERECTION & COMMISSIONING OF PUMP TESTING LAB FACILITY& INDUCTION MOTOR TESTING LAB FACILITY" and "FINANCIAL BID FOR SUPPLY, ERECTION & COMMISSIONING OF PUMP TESTING LAB FACILITY& INDUCTION MOTOR TESTING LAB FACILITY". Both envelopes should be kept in a third cover superscribing "TENDER FOR SUPPLY, ERECTION & COMMISSIONING OF PUMP TESTING LAB FACILITY& INDUCTION MOTOR TESTING LAB FACILITY".
e)	Supply of Machines and Equipments	Four months from the date of awarding the order
f)	Last date of submission of completed tender documents	**30/06/2014 upto 04:00 PM.**
g)	Date of issue of Tender	12/05/2014 (to be downloaded from NSIC web site)
h)	Estimated cost of Pump Test facilities	**32 Lakhs (inclusive of all taxes, freight etc.)**
i)	Estimated cost of Induction motor Test facilities	**106 Lakhs (inclusive of all taxes, freight etc.)**

The other Terms and Conditions applicable to this tender have been incorporated in the tender documents.

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Ref. No:- NTSC(C)/EC/LAB-1/14-15 Dated:- 09/05/2014

INSTRUCTIONS TO THE TENDERERS

The Tender shall be submitted in accordance with these instructions and any tender not conforming thereto is liable to be rejected. These instructions shall form the part of the tender and contract.

1. The tender should be submitted in two bid system – Technical Bid and Financial Bid separately as explained in "Notice Inviting Tender" in previous page. The technical bids will be opened at the first instance and evaluated by competent committee or Authority. At the second stage Financial Bids of the technically qualified Bidders only will be opened for further evaluation and ranking before awarding the contract.

2. Tender Document has to be downloaded from web site **www.nsic.co.in** and the cost of Tender Document should be enclosed with the Tender in the cover of technical Bid by way of Demand Draft/Pay Order in favour of **" NSIC Ltd. A/c NTSC."** payable at **Chennai**.

3. The tender shall be completed in all respects **(should be signed and dated by the Authorized Signatory in all pages). The tender received without tender fee and Earnest Money shall be rejected outright**.

4. Earnest Money deposit: – **5% of the quoted price** as explained in "Notice Inviting Tender" in previous page. EMD should be **rounded off** to the **nearest Rs.500 on higher sides**. (Example: if calculated **EMD is Rs.501 than Rs.1000/- is to be deposited as EMD).**

5. All participant from manufacturers/ firms/ companies are instructed to enclose attested copies of the following documents in Technical Bid cover, failing which their bids will be summarily/ out- rightly rejected:
   a. Copy of CST/VAT/TIN Registration Certificates
   b. Copy of Income Tax Return.
   c. Any other copies of Certificate (BEE/ISI/NABL/DGS&D/NSIC etc.)

FORM OF TENDER

To,
The Chief General Manager
NSIC- Technical Services Centre
Sector B-24, Guindy Industrial Estate
Ekkaduthangal, Chennai – 600 032

Dear Sir,

Subject: Offer for Supply, Erection & Commissioning of Pump Testing Lab facility& Induction Motor Testing Lab facility.

Tender No**: NTSC(C)/EC/LAB-1/14-15**

HAVING EXAMINED AND PERUSED THE FOLLOWING DOCUMENTS

1. Notice Inviting Tender
2. Instruction To The Tenderers
3. Form Of Tender
4. Terms & Conditions For Supply

I/We hereby submit our quoted rates in the enclosed format as Annexure - A. The validity of the offer is 60 days from the last date of submission of tenders. Should our tender be accepted I/We agree:-

1. A Sum of Rs._____(Rupees_____ _____ Only) as Earnest Money Deposit shall be retained by NSIC-Technical Services Centre on account of security deposit.
2. The tender document along with your delivery instructions shall constitute and bind contract between us and NSIC Technical services Centre, Chennai.
3. In the event of failure to deliver the machines/equipments within stipulated time of four months period in full, liquidated damages at the rate of 1.00 percent per week of delay with a maximum of 10 Percent will be levied for delayed supply.
4. Earnest money will be refunded to us **without any interest thereof, if our tender is not accepted**.

Enclosed Annexure –A & B

AUTHORISED SIGNATURE
Name of signatory & Seal of Firm

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Ref. No: - NTSC(C)/EC/LAB-1/14-15 Dated: - 09/05/2014

COMMERCIAL AND GENERAL TERMS & CONDITIONS

Subject: Offer for Supply, Erection & Commissioning of Pump Testing Lab facility& Induction Motor Testing Lab facility Tender No: NTSC(C)/EC/LAB-1/14-15

Sealed Tenders are hereby invited for Supply, Erection & Commissioning of Pump & Induction Motor Test Lab as per following terms & conditions:

1. Tenderers shall submit their offers in two bid system, in sealed cover superscribed as **"Tender for Supply, Erection & Commissioning of Pump Testing Lab facility& Induction Motor Testing Lab facility"** as explained in the **INSTRUCTION TO THE TENDERERS** at NSIC Technical Service Centre, Chennai on or before **30.06.2014** up to **04:00 PM.**

2. Tenderers are strictly advised to quote their rates for the machines/ equipments as per the specifications furnished in **Annexure – A & B. Excise Duty, VAT, Insurance, Packing, Transportation charges etc**. whatever applicable should be mentioned clearly.

3. The Tender should be accompanied with the Earnest Money Deposit equivalent to 5% of the quoted price as explained in the **INSTRUCTION TO THE TENDERERS** and the EMD should be deposited in the form of Demand Draft /Pay Order in favour of **"NSIC Ltd. A/c NTSC"** payable at Chennai. **No Cheque or cash shall be accepted**. EMD should be annexed with the technical bid. **The offers without Earnest Money Deposit will be rejected**. Tenderers claiming for exemption of EMD should furnish the applicable documents.

4. The validity of the offer shall be of **60 days** from the last date of submission of the Tender.

5. The Chief General Manager, NSIC-TSC, Chennai reserves all the rights to accept or reject any or all the offers. The Centre is also not bound to accept the lowest offer.

6. The offer should be made in the Tender form and marked as tender No. **NTSC(C)/EC/LAB-1/14-15 Dated: - 09/05/2014.**

7. The tenders will be opened at NTSC-Chennai **on 30.06.2014 at 4.30 PM.** The Tenderers or their authorized representatives (One person only) may be present at the time of opening of the tender.

8. The EMD deposited by the successful Tenderers shall be adjusted for the security deposit. The EMD deposited by the successful Tenderers will be refunded after issue of order to the successful Tenderer.

9. The successful Tenderers shall deliver the items to NTSC- Chennai within four months from the date of issue of order. In case the items are not supplied within the stipulated period, the **Security or Earnest Money Deposited shall be forfeited.**

10. All the machines/ equipments supplied alongwith the hardware and software should be guaranteed for one year from the date of commissioning.

11. The successful tenderer has to provide **pre dispatch inspection** at their work place before supplying the same.

12. Detailed System Engineering of the equipments should be submitted, by the successful tenderer, comprising of General arrangement drawing, Foundation layout, Wiring diagram and operation cum maintenance manual with spare parts list.

13. Training regarding trouble shooting, system's working principle, use of equipment, general up-keeping etc. should be provided by the successful tenderer.

14. Tenderers have to enclose, in the technical bid, detailed block diagram clearly explaining the system's operations.

15. Details regarding after sales service should be provided.

16. **Payment terms:** 75% of the order value against receipt of items at our Centre in good condition and the balance amount after installation, commissioning and satisfactory report of working. The Earnest money deposited will be refunded after completion of guarantee period of one year.
    Regarding EMD exempted suppliers, 75% of the order value against receipt of items at our Centre in good condition, 20% of the order value after installation, commissioning and satisfactory report of working and the balance 5% after completion of guarantee period of one year.

17. All the communication shall be addressed to:
    The Chief General Manager,
    NSIC TECHNICAL SERVICES CENTRE**,**
    THE NATIONAL SMALL INDUSTRIES CORPORATION LTD.,
    (A GOVT. OF INDIA ENTERPRISE)
    SECTOR B-24, GUINDY INDUSTRIAL ESTATE
    EKKADUTHANGAL, CHENNAI – 600 032.
    TEL: 22252335/6/7, Fax: 22254500
    Email: ntscche@nsic.co.in

18. The decision of the NSIC Technical Services Centre, Chennai will be final and binding on the Tenderers.

19. In the event of any dispute, the legal matter shall be subjected to the jurisdiction of Chennai / **Chennai court only.**

Annexure – A

Specification for Pump Testing Lab Facility

OBJECTIVE:
To set up an automatic **pump performance test bench** to minimize the human errors & human efforts for accurate measurement in very less time compared with traditional Manual testing method. **The capacity of testing set up should be provided from 0.5HP to 3 HP in single phase and from 1 HP to 150 HP in three phase.**

SCOPE OF TESTING:

- Testing of pump sets from 0.5 HP to 150 HP max. Capacity.	-Delivery size from 1" to 6".
-Flow rate range for pump is 30 lpm to 6000 lpm	-Max. Head measurement up to 500 mtrs. (50 Kg./cm2)
-Suction (Vacuum) measurement. (1 bar)	-SS Pipe line for delivery of pump to outlet, with valve & flow meter & cam lock couplings for easy installation.
-RPM measurement upto 3000 RPM	

Suitable Resting Table for Testing of Pumps under IS 9079, 6595(part1) & 8472 to be provided

Test covered:
Test of all kinds of pumps should be performed as per Indian Standards i.e. 8034, 14220, 9079, 6595(Part1) & 8472.

Following parameter should be measured:

-Single & three phase voltage. (Ph to Nu & Ph. to Ph.)	-Single & three phase ampere. (Per Ph. & Total Average)
-Single & three phase active, reactive and apparent power. (Per Ph. & Total Average)	-Frequency (Hz) and power factor
-RPM, %Slip,	-Pressure measurement (upto 50bar.)
-Flow rate Indicator (Digital O/P)	-Temperature. (Water temp. in water tank) and resistance measurement

TEST PROCESS:
Pump test to be controlled by software with help of data acquisition system, as per scope of testing. Test data to be measured by its power analyzer and other instruments. Control panel (includes power analyzer and other instruments) to be equipped with USB/RS-485/RS-232 to computer interface which provide data to PC. Customized software to record test result and generate report according to the scope of testing..

OUTPUT FROM SOFTWARE: Pump performance report

Curve for Discharge V/s Head,	Curve for Discharge V/s Current	Curve for Discharge V/s efficiency	Curve for Discharge V/s power

REQUIREMENT FOR TEST BENCH FOR FULLY AUTOMATIC PERFORMANCE TEST OF PUMP SET

ITEM No. A

Sl. No.	Description of control panel and power analyzer (branded/standard make)	Qty	Rate
1.	**Fully automatic control Panel for Single phase & three phase pump with computer system. (Amp. Capacity: as per system rating requirement)** **Specifications:** - Powder coated Panel box. - 1 ph. Starter. (Capacity: 35 Amp. minimum) - 3 Ph. Star delta starter/ DOL. - Capacitor selector switches for Start & Run. Capacitors. - Voltage Up-Down Switches (For dimmer) - Programmable Control card & relay card and data acquisition card for automation. - Pressure regulator for auto/ manual function for controlling valve with USB/ RS-485 computer interface. - Digital readout of flow indication with computer interphase. - "Auto tester" software with curve & performance report. *Note: Switchgear used in panel should be of appropriate/required current rating and branded/standard make.*	01	

Sl. No.	Description of control panel and power analyzer(branded/standard make)	Qty	Rate
2.	**The following parameters of Single phase & three phase, has to be recorded by Power analyzer with basic accuracy of 0.1%. This analyzer should be capable for measurement of the following parameters of 0.5 HP to 150 HP at no load to full load condition. Power analyzer should be computer interfaced.** - Single & three phase voltage. (Ph to Nu & Ph. to Ph.) - Single & three phase ampere. (Per Ph. & Average) - Single & three phase active, reactive and apparent power. (Per Ph. & Total) - Frequency (Hz), power factor, RPM, %Slip, CRPM. - Pressure measurement Flow rate Indicator (Digital O/P) - Computer I/F through USB/RS-232. **Note:** **Measurement of said parameters should be done either by one power analyzer or by maximum of two power analyzers (current capacity as per system rating requirement) and accordingly the rate with capacity should be quoted.**	01 set	
3.	**Pressure transmitter (branded/standard make)** Range: 10 bar, 30 bar & 60 bar. Over load limit: 3 times. Output: 4-20 mA, Supply: 10 to 30 VDC. Housing: stainless steel, Basic Accuracy: 0.5% .	01	
4.	**Suction (Vacuum) transmitter (branded/standard make)** Range: 1 bar, Absolute. Over load limit: 3 times. Output: 4-20 mA, Supply: 10 to 30 VDC. Housing: stainless steel, Basic Accuracy: 0.5%.	01	
5	**The following items is to be quoted separately for electromagnetic flow meters for each size separately (branded/standard make)** **DESCRIPTION :** Electromagnetic flow tube with Remote display & converter unit each of following sizes. Flow range upto 6000 LPM. Basic accuracy of 0.5% suitable arrangement should be made for different size of pipe.		
5.1	Size: 25 mm.	01	
5.2	Size: 32 mm.	01	
5.3	Size: 40 mm.	01	
5.4	Size: 50 mm.	01	
5.5	Size: 65 mm.	01	
5.6	Size: 80 mm.	01	
5.7	Size: 100 mm.	01	
5.8	Size: 125 mm.	01	
5.9	Size: 150 mm.	01	
6	**The following items is to be quoted separately for automatic valves for each size (branded/standard make)** **DESCRIPTION:** SS ball valve/Gate valve with three phase electrical/Pneumatic actuator wall positioner and manual operation. Dual operation(manual and automatic both) Pressure range: 50 Kg/cm2		
6.1	Size: 1",	01	
6.2	Size: 1.25''	01	
6.3	Size: 1.5''	01	
6.4	Size: 2.0''	01	
6.5	Size: 2.5''	01	
6.6	Size: 3.0''	01	
6.7	Size: 4.0''	01	
6.8	Size: 5.0	01	
6.9	Size: 6.0''	01	

Sl. No.	Description of control panel and power analyzer (branded/standard make)	Qty	Rate
7	**The following items is to be quoted separately for piping for each size (branded/standard make)** **DESCRIPTION :** Piping & fabrication work for testing of all type of pumps. Specification: - SS pipe lines for delivery of pump (Total 9 Nos. of pipe lines from 1" to 6" pumps.) - Manual Ball/ Gate valve for each line. (Total 9 valve from1" to 6") - Cam lock coupling fitted at end of each line. (SS -316) - Flow strainer fitted in each line. - Stand included for remote display of each flow meter. - Flexible pipe fitted at end of each line. - Fabrication work with proper support to remove vibration for each line. - Matting flanges, gaskets & nut bolts for each line.		
ITEM No. B			
Sl. No.	**Description of Laptop (branded/standard make)**	**Qty**	**Rate**
1.	4th Generation Intel Core i5 Dual-Core, 1.6 GHz , 4 GB DDR3L expandable upto 12 GB, 64-bit , Windows 8 license version, 8X Super Multi DVD Writer , 500GB HDD, Nvedia graphic processor, USB optical mouse, with license version MS OFFICE.	01	
ITEM No. C			
Sl. No.	**Description of Auto transformer/variac (standard make)**	**Qty**	**Rate**
1.	Three phase oil cooled variac/auto transformer with motorized unit. (With oil). Output Voltage: 0 to 470 volt Amp. Capacity: 100 Amp	01	
ITEM No. D			
Sl. No.	**Description of Item**	**Qty**	**Rate**
1	**Portable Ultrasonic Flow meter (Reputed make/ Standard)** 10 to 3400 mm dia of pipe size. Accuracy: 0.5% of measured value Velocity: 0 to 25 m/s. Temperature of media: (-30°C to 130°C) Full specification/parameters to be mentioned.	01	
2	Transducers / sensors suitable for the above Portable Ultrasonic Flow meter in different range. (to be quoted individually for each range)		

Note:

- All measuring and sensing instruments to be accompanied. **Calibration Certificate from NABL accredited lab** should be submitted at the time of supply.
- **Item No. A** is considered as **one set** but, the quotation should be submitted separately as per serial and sub serial number.
- The operating system voltage for single phase is 220/230 Volt and for three phase 400/415 Volt. at 50 Hz.
- Control panel should be well equipped with all the necessary protection system namely:
    a. Dynamic short circuit protection.
    b. Under voltage monitoring.
    c. DC bus over voltage protection.
    d. Over current protection.
    e. Over temperature protection.

Annexure – B

Specification for Induction Motor Testing Lab Facility

OBJECTIVE: To set up of automatic test beds for testing of induction motors **by regenerative method** to minimize power consumption. **Power consumption should be 40% or less, taken from Grid at full load condition,** compared to traditional testing by using dynamometer method. **The capacity of testing Setup should be provided from 0.5HP to 3.0 HP in single Phase and from 1.0 HP to 150HP in three phase** in suitable number of beds **(upto four maximum)**.			
SCOPE OF TESTING:			
- Testing of single and three phase induction motors upto max. 150 HP. Capacity	- Testing of motors from 132S to 315L frame size		
- Testing of motor speed upto 3600 RPM	- Testing of torque upto 2000 Nm		
- Motor resting table with hydraulic/pneumatic system upto 300 mm (minimum).			
Test to be covered as per IS 996, IS 325, IS 12615			
- I.R (Insulation resistance) test	- H.V test		
- Measurement of resistance of windings of stator and wound rotor	- No load test at rated and various voltage to determine input power, current and speed.		
Open circuit voltage ratio of wound rotor motors (slip ring motors)	- Reduce voltage running up test at no load (for squirrel cage motors upto 37 KW)		
- Locked rotor readings of voltage, current & power input at suitable reduced voltage	-Full load test to determine efficiency, power & slip		
- Full load test at various voltages with output keeping constant	- Temperature rise test		
- Locked rotor test to determine breakaway torque	- Momentary overload test		
- Pull-up & Pull-out torque test	- Over speed test		
- Surface temperature measurement of motor at various location	- Occasional excess current test (1.5 time of rated current upto min. 2 minutes))		
- Direction of rotation	- Load test at various load upto 150%		
Measurement facility of following parameters:			
-Single & three phase voltage. (Ph to Nu & Ph. to Ph.)	-Single & three phase ampere. (Per Ph. & Total Average)		
-Single & three phase active, reactive and apparent power. (Per Ph. & Total average)	-Frequency (Hz) and power factor		
-RPM, %Slip,	-Torque measurement		
- Resistance of winding	-Temperature		
TEST PROCESS: Induction motor test to be controlled by software with help of data acquisition system, as per scope of testing. Test data will be measured by control panel (includes power analyzer and other instruments) interfaced through USB/RS-485/RS-232 to computer, to provide data. Software installed in computer receives all data from instruments and generate reports and graphs accordingly.			
OUT PUT FROM SOFTWARE: Motor performance report			
Curve for load current Vs output	Torque Vs Speed at various load at rated voltage of motor	Efficiency Vs output	Power factor Vs output
% Slip Vs. output	Load current Vs Slip	NL voltage Vs NL current	

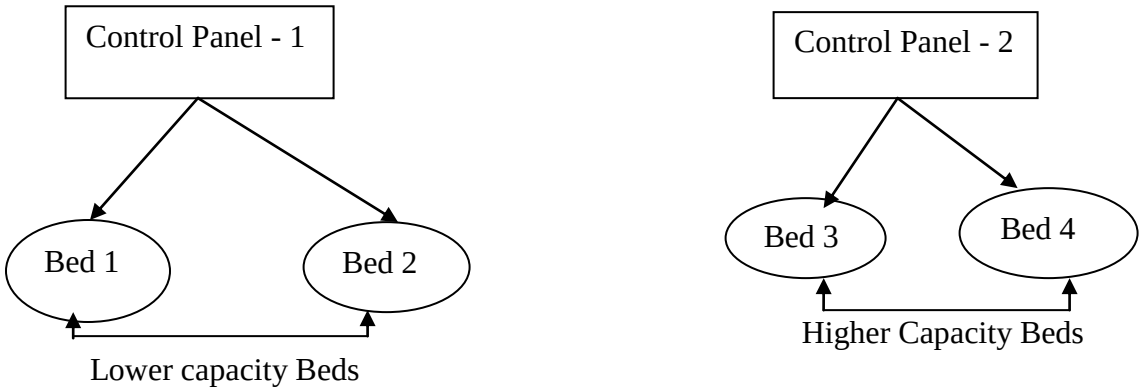
Test bed for testing of single phase and three phase induction motors from 0.5HP to 150HP			
Sl. No.	**Description of Item No. A - Control Panel with Power Analyzer (branded/standard make)**	**Qty**	**Rate**
1.	Control Panel for testing of single and three phase motor with computer system. Number of control panels should be as per the required rating, either one or maximum two. Specification: - Powder coated panel box. - 1 ph. Starter. (Capacity: 35 Amp. minimum.) - Capacitor selector switches for start & Run. Capacitors. 3Ph. Star delta starter. (capacity: as per system rating requirement) - Voltage up-Down switches. (For dimmer) - Programmable control card & relay card, data acquisition card. - Motor testing software with curve & performance report. ***Note: Switchgear & wires used in panel should be of appropriate/required current and standard make.***	01 set	
2.	**The following parameters of Single phase & three phases should be measured by Power analyzer with basic accuracy 0.1% for power, voltage, current, frequency, power factor, RPM & slip and 0.5% for torque, resistance & temperature measurement & computer interface. This analyzer should be capable for measurement of the following parameters of 0.5 HP to 150 HP at no load to full load condition.** - Single & three phase voltage. (Ph to Nu & Ph. to Ph.) - Single & three phase ampere. (Per Ph. & Average) - Single & three phase active, reactive and apparent power. (Per Ph. & Total) - Frequency (Hz), power factor, RPM, %Slip, CRPM. - Computer I/F through USB/RS-232. **Note:** **Measurement of said parameters should be done either by one power analyzer or by maximum of two power analyzers (current capacity as per system rating requirement) and accordingly the rate with capacity should be quoted.**	01 set	
3.	Fabricated motor resting table with hydraulic/pneumatic system (suitable for all types of motor frame size), Pneumatic break, Disc type coupling & triple/double axis table with 0-300 mm stroke.	01	
4.	Magnetic and laser type speed sensor Make: branded /standard.	01	
5.	Regenerative drive(capacity: as needed) Make: branded /standard	01	
6.	Loading motor (capacity: as needed)	01	
7.	Vertical type Eddy current Dynamometer (Air Cooled) upto the capacity of 5.0 HP for loading of single phase submersible motor to find out efficiency graph. It should also be controlled by one control panel mentioned in Sl.No. 1 above.	01	
Sl. No.	**Description of Item No. B (Auto Transformer/Variac) (standard make)**	**Qty**	**Rate**
1.	Three phase oil cooled auto transformer with motorized unit. (with oil) Amp. capacity: 400 Amp./0-470 volt.	01	
2.	Three phase oil cooled auto transformer with motorized unit. (with oil) Amp. capacity: 300 Amp./0-470 volt.	01	
3.	Three phase oil cooled auto transformer with motorized unit. (with oil) Amp. capacity: 200 Amp./0-470 volt.	01	

Sl. No.	Description of Item No. C (Desk Top Computer) – Branded Make		Qty	Rate
1.	CPU: Intel core i5, 3.2 GHz, Hard disk Drive: 500 GB, 7200 rpm or higher, Memory: 4 GB 1600MHz DDR3 RAM with 32 GB Expandability, Monitor: 47 cm or larger (18.5" or larger) LED digital color Monitor TCO-05 certified, Key Board: 104 Keys with USB interface, Mouse: Optical with USB interface, Ports: 6 USB ports including 2 USB 3.0 ports (With atleast 2 in front) audio ports for microphone and head phone in front. Cabinet: Mini Tower & Laser printer. (with license version for operating system windows 8 professional)		**01**	
3.	**Bench Top 6.5 digit multimeter(**with Computer interface RS 232/USB.**): - Branded Make**			
	V- DC Range: 100 mV to 1000V Accuracy: 0.01% **A - DC:** Range: 100μA to 10A Accuracy: 0.1%	**V - AC:** Range: 100 mV to 1000 V Frequency: 3 Hz to 100 KHz. Accuracy: 0.1% **A - AC:** Range: 100mA to 10A Accuracy: 0.5%	**01**	
	Resistance: Range: 10Ω to 1 GΩ**,** Accuracy: 0.1%,			
4.	**Microhmmeter: - Branded Make** 4.5 digit, Measurement range: 1μΩ to 2,000Ω, 0.1% accuracy, with four wire measurement method, temperature compensation		**01**	
5.	**Vibration meter(**3.5 digit**) - Branded Make** acceleration: 0.01 to 200 mm/s² Velocity: 0.01 to 200 mm/sec (RMS) Displacement: 0.01 to 200 mm(RMS) Frequency: 10 Hz to 10 kHz With basic accuracy 0.5%,		**01**	

NOTE:

- All measuring and sensing instruments to be accompanied. **Calibration Certificate from NABL accredited lab** should be submitted at the time of supply.
- **Item No. A** is considered as **one set** but, the quotation should be submitted separately as per serial number.
- **In Item No. A Serial No.** 1, Two Nos. of control panels are needed in different capacity. The capacity of first panel should be common for lower capacity of two beds and second panel should be common for higher capacity of two beds if four beds are needed. In case only three beds are needed, then middle capacity of bed should be operated by both panels in respect of capacity of switch gears & wires of panels, as mentioned in diagram below. In case the number of bed is less than three, then each bed should be connected with separate panel.
- The operating system voltage for single phase is 220/230 Volt and for three phase 400/415 Volt. at 50 Hz.
- Control panel should be well equipped with all the necessary protection system namely:
    a. Dynamic short circuit protection.
    b. Under voltage monitoring.
    c. DC bus over voltage protection.
    d. Over current protection.
    e. Over temperature protection.

FOUR BED SYSTEM



THREE BED SYSTEM