

Civil Engineering Department
IIT Delhi, Hauz Khas, New Delhi -16

Sealed Quotations are invited in Indian Rupees (INR) **OR** USD/GBP from well known companies/distributers or their authorized representatives for supply of following equipments conforming to technical specifications and prescribed terms & conditions as given hereunder. Interested parties are required to submit their quotations.

The bid should be addressed to Dr. D. R. Kaushal and submitted in Department of Civil Engineering, IIT Delhi, Hauz Khas, New Delhi-110016 latest **by 3:00 PM** on **February 2, 2012**.

S.N.		Technical Description
1	Turbine Service Unit	<ul style="list-style-type: none"> • A bench top service unit which provides a suitable water supply for testing a range of different turbines. • Clear acrylic reservoir which holds up to 28 litres. • Peripheral type pump providing up to 20 litres per minute or up to 30m head (not simultaneously). • Paddle wheel type flow meter. • Magnetic type dynamometer controlled from software. • Software control of both pump and brake allows remote operation of the equipment over an internet. • Links to a suitable computer via a USB interface device which does not require internal access to the computer. Also allows interfacing to other software packages. • Supplied with full education software package including comprehensive results processing and help facilities. • Overall dimensions: Height: 0.73m Width: 0.80m Depth: 0.51m
2.	Reaction turbine	<p>Must be a small scale reaction turbine unit which is designed to be used in conjunction with the service unit.</p> <p>Must consist of an inlet manifold which supplies water to a central hub, and the water exits the hub radially through two square orifices.</p> <p>Instructional Capabilities: Determining the characteristics of the turbine, including the relationships of volume flow rate, head, torque produced, power output and efficiency</p> <p>Specifications:</p> <ul style="list-style-type: none"> ○ Maximum Power should be 25W ○ Maximum Speed should be 8000rpm

		<ul style="list-style-type: none"> ○ Maximum Torque should be 0.12Nm • The hub must be connected to the manifold using a graphite face seal. • Dynamometer (includes speed Sensor, Magnetic Brake, Load cell) • Union converter (to regulate the flow by using O ring), Electronic sensors for measurement of the flow & Motor RPM, Torque. • The turbine must be mounted on a horizontal shaft with a clear acrylic splash guard to allow maximum visibility of the workings. • The unit must incorporate a pressure sensor to measure the inlet condition of the water. • This pressure should be accurately controlled using the software supplied with the service unit. • Must connect to a PC via the service unit and a USB interface device. • Dimensions should be: Height: 0.29m, Width: 0.56m, Depth: 0.18m.
3	Pelton Turbine	<p>Must be a small scale Pelton turbine unit which is designed to be used in conjunction with the service unit.</p> <p>Must consist of an inlet manifold which supplies water to a spear valve which allows users to vary the jet cross section while maintaining the water velocity.</p> <p>Instructional Capabilities:</p> <ul style="list-style-type: none"> • Determining the characteristics of the turbine, including the relationships of volume flow rate, head, torque produced, power output and efficiency to rotational speed. • Comparison of throttle control and spear valve control of the speed of a Pelton turbine. <p>Specifications:</p> <ul style="list-style-type: none"> ○ Maximum Power should be 23 W ○ Maximum Speed should be 3800 rpm ○ Maximum Torque should be 0.20 Nm • The runner itself must be mounted in a clear acrylic enclosure to allow maximum visibility of the workings. • Dynamometer (includes speed Sensor, Magnetic Brake, Load cell) • Union converter (to regulate the flow by using O ring), Pressure sensor, Manifold contains Spear & control Valve, Electronic sensors to measure the flow & Motor RPM, Torque. • The unit must incorporate a pressure sensor to measure the inlet condition of the water. • This pressure should be accurately controlled using the software supplied with the service unit. • Must connect to a PC via the service unit and a USB interface device. • Dimensions should be: Height: 0.33m, Width: 0.52m, Depth: 0.14m.

4	Interface Unit with Software	<ul style="list-style-type: none"> • A computer interface accessory for use with Turbine Units. • Connects to Turbine Units equipment sensors via a single multi-way connector. • 3-phase mains output with variable frequency for accurate motor speed control. • Sensor-less vector motor drive to measure motor torque. • Automatic slip compensation to maintain constant speed. • Secondary mains output, switched under software control. • Interface driver allows linking to other software packages. • Built-in watchdog circuitry for remote operation (with suitable equipment). • The analogue output data should be digitised and transferred to a computer using the standard USB (Universal Serial Bus). This allows any standard modern Windows computer to be used, including notebooks, and does not require any internal access to the computer. • The equipment should be supplied complete with a USB lead for connection to the computer. The Turbine Demonstration Units interface to the computer via the Turbine Service Unit and Interface Unit device and the USB port of the computer. • Software driver that allows the outputs to be read in other software programs, such as Labview should be made available. • Windows based software should be supplied with the Turbine Units offering a complete teaching package of coursework and laboratory investigation. • Easily explore the principles of each machine quickly and easily, highlighting the difference between theoretical and practical measurements. • The software runs under Windows operating systems. <p>Also:</p> <ul style="list-style-type: none"> > Diagrammatic representation of the equipment, complete with real time display of the various sensor outputs > Presentation screens, giving an overview of the software, the equipment, the procedure and associated theory > Detailed 'Help' facilities giving in depth guidance > Automatic data logging of sensor values into a spreadsheet format > Control over sampling intervals > Student questions and answers, including a layered 'Hint' facility > Processing of sampled values (this may be linked to the questions and answers to ensure student understanding) > Sophisticated graph plotting facilities of both measured and calculated values, including comparisons taken under different conditions > Export of data to Microsoft Excel or other spreadsheets > Links to user defined word processor > Calibration facility for sensors > Real time bar graph display of sensor outputs > Recent history graphical display
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Terms and Conditions:

1. The **Technical Bid** with detailed specifications and **Commercial Bid** for financial details should be in **two separate sealed envelopes**, put into one larger envelope. All envelopes should bear the **title** of the item quoted and the content, failing which the quotation shall be rejected.
2. Vendor should attach a letter from the manufacturer/their product principal permitting to quote for this tender for authenticity of dealership/agency and the dealer should be an authorized service provider. Quotations without authorized service provider certificate will be rejected.
3. Vendor should get a certificate for this particular quote directly from their product principal clearly mentioning about two years on site comprehensive warranty of the equipment to be delivered. Vendor may also quote for third year additional warranty charges separately if any.
4. The Company/Manufacturer should be registered for ISO certificate. The Company/Vendor should attach a copy of the certificate.
5. It may prefer to run both the turbines using common Interface Unit and Service unit connecting through Computer System.
6. The Vendor should have minimum annual turnover of Rs.10.0 crore and minimum experience for selling similar kind of equipment should be at least 2 years.
7. In case the items are proprietary products of the company, a proprietary item certificate stating the same may be provided.
8. Special discount/rebate wherever admissible keeping in view that the supplies are being made for educational purpose in respect of Public Institution of national importance may please be indicated.
9. Delivery period should be clearly mentioned.
10. Validity of the quotation should be at least 3 months.
11. Taxes, Terms and Conditions should be clearly mentioned.
12. In case of import of product, payment shall be made through L/C and the foreign bank charges for L/C will be borne by the beneficiary.
13. All prices quoted should be CIF IIT Delhi.
14. Vendor should attach the relevant product brochure/leaflet for the model quoted.
15. Supplier/Vendors will do the installation of Equipment at IIT Delhi without any extra cost.
16. The power cables used for equipment supplied should be compatible as per Indian power supply standards i.e Single phase AC 230 Volts, 50/60 Hz.
17. In case a Computer System is required for processing of observed data of the equipment to be supplied in that case Computer System would be made available by us. The price for computer system should not be included in the equipment's cost but the software for data transfer from the equipment should be compatible with Windows environment i.e MS Windows XP/ MS Windows Vista/ MS Windows 7 Operating Systems.

Note: The institute/committee has the right to accept or reject any bid or all quotations without assigning any reasons whatsoever.