ANNEX 1: LOT 1:- BUILDING AND CIVIL ENGINEERING EQUIPMENT TO SIAYA INSTITUTE OF TECHNOLOGY – SIAYA COUNTY

Price Schedule: Goods Manufactured Outside the Purchaser's Country, to be Imported – Siaya Institute of Technology								
				(Group C Bids, goods to be imported) Currencies in accordance with ITB 15			Date: _____ OCBI / LCB No: _____ Alternative No: _____ Page N° _____ of _____	
1	2	3	4	5	6	7	8	9
Line Item N°	Description of Goods	Country of Origin	Delivery Date as defined by Incoterms	Quantity and physical unit	Unit price cip final destination **Siaya Institute of Technology**	CIP Price per line item (Col. 5x6)	Price per line item for inland transportation and other services required in the Purchaser's Country to convey the Goods to their final destination as specified in BDS in accordance with ITB 14.9 (b) (ii) [This column is not applicable if destination as per column 6 under ITB 14.9 (b) (i) and final destination as per ITB 14.9 (b) (ii) is the same]	Total Price per Line item (Col. 7+8)

BCEE 130	Compressible Flow Bench		18 Months from date of contract signing	1 pcs				
BCEE 131	Training Equipment In Industrial Hydraulics		18 Months from date of contract signing	1 pcs				
BCEE 132	Pressure Measurement Bench		18 Months from date of contract signing	1 pcs				
BCEE 135	Compressible flow range with reaction turbine		18 Months from date of contract signing	1 pcs				
BCEE 136	Essential Accessories For Computer Interfaced Fluid Machine		18 Months from date of contract signing	1 pcs				

1. List of Goods and Delivery Schedule - Siaya Institute of Technology

Line Item N°	Description of Goods	Quantity	Physical unit	Final Destination (Project Site) as specified in BDS	Delivery (as per Incoterms) Date		
					Earliest Delivery Date	Latest Delivery Date	Bidder's offered Delivery date [*to be provided by the Bidder*]
BCEE 130	Compressible Flow Bench	1	pcs	Siaya Institute of Technology	9 Months From the date of contract signing	12 Months From the date of contract signing	
BCEE 131	Training Equipment In Industrial Hydraulics	1	pcs	Siaya Institute of Technology	9 Months From the date of contract signing	12 Months From the date of contract signing	
BCEE 132	Pressure Measurement Bench	1	pcs	Siaya Institute of Technology	9 Months From the date of contract signing	12 Months From the date of contract signing	
BCEE 135	Compressible flow range with reaction turbine	1	pcs	Siaya Institute of Technology	9 Months From the date of contract signing	12 Months From the date of contract signing	
BCEE 136	Essential Accessories For Computer Interfaced Fluid Machine	1	pcs	Siaya Institute of Technology	9 Months From the date of contract signing	12 Months From the date of contract signing	

SUMMARY OF TECHNICAL SPECIFICATIONS

The Goods and Related Services shall comply with following Technical Specifications and Standards:

Item No	Name of Goods or Related Service	Technical Specifications and Standards	Compliance
BCEE 130	Compressible Flow Bench	Flow of compressible fluids Subsonic and sonic flow through different measuring objects Features -investigation of flow in compressible fluids - varied range of experiments for studying subsonic and sonic flow - de Laval nozzle generates velocities up to Ma 1Learning objectives/experiments - pressure losses in pipes and pipe elbows -flow in convergent/divergent nozzles determine the speed of sound in air - compare calculation methods for incompressible and compressible flow -use complete continuity equation - determine mass flow rate using nozzle and volumetric flow rate using orifice -record calibration curve for orifice -record fan characteristic curve at different mass flow rates and speeds Specification [1] investigate flow of compressible fluids [2] subsonic and sonic air flow [3] variable speed on the radial fan for adjusting the mass flow rate [4] minimised turbulence by drawing in air and optimum arrangement of the measuring objects [5] transparent measuring objects with connectors for pressure measurement provide insight into the internal structure [6] measuring nozzle for determining the mass flow rate [7] pressure losses in subsonic flow in pipe elbows and various pipe sections [8] pressure curve at subsonic and sonic nozzle flow [9] orifice for determining volumetric flow rate by differential pressure measurement [10] record fan characteristic curve usinga throttle valve [11] digital displays for pressures, velocity and speed Technical data MODEL NO HM 230	

Item No	Name of Goods or Related Service	Technical Specifications and Standards	Compliance
		Flow of compressible fluids Subsonic and sonic flow through different measuring objects Features - investigation of flow in compressible fluids - varied range of experiments for studying subsonic and sonic flow - de Laval nozzle generates velocities up to Ma 1 Learning objectives/experiments - pressure losses in pipes and pipe elbows -flow in convergent/divergent nozzles -determine the speed of sound in air - compare calculation methods for incompressible and compressible flow - use complete continuity equation -determine mass flow rate using nozzle and volumetric flow rate using orifice - record calibration curve for orifice - record fan characteristic curve at different mass flow rates and speeds Specification [1] investigate flow of compressible fluids [2] subsonic and sonic air flow [3] variable speed on the radial fan for adjusting the mass flow rate [4] minimised turbulence by drawing in air and optimum arrangement of the measuring [5] transparent measuring objects with connectors for pressure measurement provide [6] measuring nozzle for determining the mass flow rate [7] pressure losses in subsonic flow in pipe elbows and various pipe sections [8] pressure curve at subsonic and sonic nozzle flow [9] orifice for determining volumetric flow rate by differential pressure measurement [10] record fan characteristic curve using a throttle valve [11] digital displays for pressures, velocity and speed Technical data Radial fan -max.speed:31000min-1 - max. volumetric flow rate: 226m3/h -max.head: 318mbar - max. power consumption: 1,8kW	

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		Measuring objects pipe section: 1m --Ø16,24,34mm -90° pipe elbow - 2 nozzles, inner diameter: 12...34mm --with sudden enlargement --with gradual enlargement (de Laval nozzle) -orifice with orifice disks --Ø12,19,25,32mm -throttle valve: Ø 34mm Measuring ranges - speed: 0...99999min-1 -pressure: --1x 0...25mbar --1x 0...600mbar --1x 0...1000mbar - velocity: 0...65m/s 230V, 50Hz, 1 phase 120V, 60Hz, 1 phase, 230V, 60Hz, 1 phase UL/CSA optional LxWxH:1750x600x390mm Weight:approx.58kg	
BCEE 131	Training Equipment In Industrial Hydraulics	Training Equipment in Industrial Hydraulics Universal Testing Frame constructed of a twinned steel channel frame fastened with high tensile fixings. This creates an overall structure size of 4.61m long, 2.53m high and 1.2m wide and a working space of 4.0m long x 1.6m high.	

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		The 0.60m spacing between the verticals allows for wide test specimens to be tested. The base feet distribute the self weight of about 1 tonne to four anti-vibration leveling feet. The top channel members are used to carry either a single or double acting hydraulic ram Carriage. Accessories to be included: load supports, reaction plates, clamps, dial gauge support bars, half round and full roundbearings, height spacing units and clamps. All these accessories enable specimens to be set up quickly and easily in a variety of arrangements. A set of hollow steel dial gauge support bars should also be included. The system should be supplied with: A 20 tonne double acting ram on a moveable carriage to fit the 300 kN Universal Testing Frame Ram operates from a hand pump mounted on a mobile table, with digital pressure indicator and integral shelf Two hoses with self sealing couplings to be included To be used in conjunction with the 300 kN Universal Testing Frame and its standard set of accessories A 3.6 m lighting track supplied at 1 m from top edge of the frame Four flood lamps in fittings that slide in the track	

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		Single ram acting hydraulic piston stroke 250mm fitted with wheels to allow moving the piston freely along the frame operated with 700 bar hand pump and shut-off valve and pressure direction valve. Protective guard should be included with transparent 450 mm square shield & 5mm thick. Four Dial gauges with magnetic holders should be included (25mm x 0.01mm). Digital display unit should be included and connected with hydraulic pump pressure sensor Data acquisition unit should be included with designed interface to function with UTM experiments fitted with appropriate transducers. It has the facility to display, record, store and review parameters of strain, pressure, force and deflection and can be operated To be supplied with a mains connector and 6 m of cable	
BCEE 132	Pressure Measurement Bench	The trainer should include Deadweight Tester enables students to visualize the Force/unit Area of pressure and to understand the way in which a known pressure is generated. The unit is mounted on a base and consists of an oil reservoir which feeds oil	

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		to the main control valve at the base of a piston barrel. The weight carrier and piston slides in the piston barrel and apply a known pressure onto a column of oil. This is connected to a pressure gauge carrier he combination of the weight carrier and standard weights supplied allows students to calibrate the pressure gauge up to 240kN/m2 at regular increments. Including Pressure Transducer and Digital Display allow students to calibrate an electronic transducer and relate the pressure points to the electronic signal.	

BCEE 135	Compressible flow range with reaction turbine	Compressible flow range Computer Linked: The phenomenon of compressible flow, sonic velocity and supersonic flow is possibly one of the most demanding areas of study for many students. The Base Unit consists of an instrumentation and control console that supplies a variable flow of compressed air to the range of optional modules, Brake Load Indicator: 0.01N resolution, Temperature Selector Switch, Thermocouple sockets: Six, Digital Tachometer Indicator, Return Air Flow meter: 0..12 g/s, Gauge Pressure: 0…1100 kN/m2, Includes 21 channel data logger With HDL software, 48 screw terminals, push-on edge connection, 20 external channels, 1 internal channel (mains Voltage), USB cable to PC USB port can be used via a USB splitter with up to 3 loggers. Utilizes HDL software Including Nozzle Pressure Distribution Module: Two convergent-divergent nozzles of with the same throat diameter but different discharge area and a single convergent nozzle having the same diameter are supplied and fit in the common test section. All three nozzles have axial static pressure tapings	

		allowing the approach, throat and divergent section pressures to be measured. The variation of pressure ratio and mass flow may be investigated for all three nozzles. Standard unit includes convergent – divergent ducts designed to produce Mach 1.0 at the throat and supersonic velocities downstream. 2 x Convergent-Divergent, 1 x Convergent, 1 x Back Pressure, Gauge: 0…1100kN/m2, 8 x Nozzle Pressure Gauge, 2 x Thermocouples Including Experimental reaction turbine computer linked: The Reaction Turbine Module turbine is a single stage, radial flow, two jet reaction machine, operating on air. With a throttle valve and belt brake dynamometer, inlet and outlet air temperatures are recorded allowing the temperature drop due to work output to be measured. Investigation of torque/speed and power/speed characteristics of a single stage reaction turbine. Production of torque/speed and power/speed curves from a no load speed of approximately 35,000 rev/min to stall and at a range of inlet pressures. Determination of the isentropic efficiency of a turbine. Construction of retardation curve	

		and from this the estimation of the effect of resistances due to mechanical and fluid Page 10 of 25 friction. Turbine Speed: 35,000 rpm (continuous), Turbine Speed: 40,000 rpm (short periods only), Pressure Relief valve setting: 100kN/m2.	

Item No	Name of Goods or Related Service	Technical Specifications and Standards	Compliance
BCEE 136	Essential Accessories For Computer Interfaced Fluid Machine	Experiments with a gear pump Record characteristics of a rotary positive displacement pump Features - illustrative model of a gear pump - closed oil circuit - software for data acquisition, visualisation and operation - part of the Labline fluid energy machines Learning objectives/experiments - principle of operation of a gear pump -recording of pump characteristics -relationship between head and speed - effect of pressure limitation - determination of efficiencies Specification [1] functioning and operating behaviour of a gear pump [2] closed oil circuit contains a gear pump with variable speed via frequency converter and a transparent tank [3] transparent housing for observing the pump gears [4] needle valve for adjusting the flow rate [5] overflow valve for adjusting the head [6] sensors for temperature and pressure at inlet and outlet of the pump [7] oval wheel meter as flow sensor [8] due to integrated microprocessor-based instrumentation no additional devices with error-prone wiring are required [9] display and evaluation of the measured values as well as operation of the unit via software [10] software with control functions and data acquisition via USB under Windows 8.1,10including PC1 Computer-System with 21" TFT-Monitor Win 10 engl.Technical data Gear pump with speed-controlled drive -power consumption:370W - nominal speed: 100...750min-1 -max.flow rate: 32cm3 per revolution -max.head: approx.80m Overflow valve: 0...5,5bar Measuring ranges - pressure (inlet): ±1bar - pressure (outlet): O...5bar -flow rate:0...25L/min	

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		-temperature: 0...100℃ 230V,50Hz,1 phase 230V,60Hz, 1 phase; 120V,60Hz, 1 phase UL/CSA optional	