

TENDER NOTICE

Sealed Tenders are invited from the Firms, Authorized Distributors/Dealers/Supplier having established credentials in terms of Technical, Financial and Managerial capabilities for the supply of Laboratory Equipment for, **Civil Engineering Department**, University College of Engineering & Technology, The Islamia University of Bahawalpur as per details given below, on For basis at Baghdad-ul-Jaded Campus.

Tender No.	Category	Estimated Cost	Bid Security (2%)
A	Supply of Fluid Mechanics Laboratory Equipment (Qty. & Specifications as available in Tender Documents)	Rs. 30,100,000/-	Rs. 6,02,000/-
B	Supply of Engineering Mechanics Laboratory Equipment (Qty. & Specifications as available in Tender Documents)	Rs. 34,330,000/-	Rs. 6,86,600/-
C	Supply of Highway Laboratory Equipment (Qty. & Specifications as available in Tender Documents)	Rs. 9,840,000/-	Rs. 1,96,800/-
D	Supply of Geotechnical Laboratory Equipment (Qty. & Specifications as available in Tender Documents)	Rs. 22,040,000/-	Rs. 4,40,800/-
E	Supply of Survey Laboratory Equipment (Qty. & Specifications as available in Tender Documents)	Rs. 12,000,000/-	Rs. 2,40,000/-

- Interested bidders may get the Tender Documents containing detailed specifications, terms and conditions from the Purchase Section, Treasurer's Office Abbasia Campus, the Islamia University of Bahawalpur during the office hours 8:00 A.M. to 4:00 P.M. on submission of written application on letter head and a copy of CNIC or can be downloaded from the IUB website www.iub.edu.pk OR PPRA website www.ppra.punjab.gov.pk on payment of (Non Refundable Fee) of Rs.1000/- (separately for each category) through Bank challan HBL in A/C 14730000010403 or pay order in the name of the Treasurer Islamia University of Bahawalpur. Original receipt should be attached with Technical bid.
- 02% bid security** of the **Total Estimated Cost** as mentioned above separately in each category (Refundable) in shape of CDR shall be attached with the bid, otherwise the bid will be rejected.
- Single Stage – Two Envelopes** bidding procedure will be adopted as per PPRA Rules 38- 2(a). The Envelopes shall be marked as “**TECHNICAL PROPOSAL**” and “**FINANCIAL PROPOSAL**” in legible letters. Financial Proposal of bids found technically non-responsive shall be re-turned unopened.
- Procurement shall be governed under the Punjab Procurement Rules, 2014.
- The rates should be quoted inclusive of all taxes. Copy of paid bank Challan Professional tax also be provided.
- The Islamia University of Bahawalpur however, reserves the right to reject all bids at any time prior to acceptance of a bid as per clause 35 of the Punjab Procurement Rules and grounds of rejection will be conveyed to the bidders upon their request.
- Tender should reach in the Office of the Chairman (SMPC), Department of Mathematics; The Islamia University of Bahawalpur up to **31.1.2018** by **11.00 a.m.** Tenders will be opened on the same day at **11.30 a.m.** in the presence of bidders or their representatives.
- Any bid submitted after the given time shall not be accepted.
- All Taxes will be applicable as per Govt. Rules & Regulations.
- The rates should be valid upto 120 days from the date of opening the tender.
- In case of closed/forced holidays, tender opening time/date will be considered as the next working day.



Chairman SMPC
The Islamia University of Bahawalpur
Baghdad-ul-Jaded Campus, Bahawalpur.

Phone: 062-9255480

IPB-25

TENDER A: FLUID MECHANICS LABORATORY

Sr. No.	Items	Qty.	Specifications
1	Hydraulic Bench	09	<p>Required features in the experimental setup: Hydraulic Bench; base module for supplying experimental units in fluid mechanics, closed water circuit with storage tank, submersible pump and measuring tank, measuring tank divided in two for volumetric flow rate measurements, measuring beaker with scale for very small volumetric flow rates, measurement of volumetric flow rates by using a stopwatch, work surface with integrated flume for experiments with weirs, work surface with inside edge for safe placement of the accessory and for collecting the dripping water, storage tank, measuring tank and work surface made of GRP.</p> <p>Required dimensions of the item: Pump; power consumption: 250W, max. Flow rate: 150L/min. max. Head: 7.6m, Storage tank, capacity: 180L.</p>
2	Dead Weight Calibrator	01	<p>Required features in the experimental setup: Bourdon tube pressure gauge for pressure measurement, transparent dial face with a view of the spring mechanism, accurately fitting piston and cylinder of the piston manometer without seals, hydraulic oil for transfer of the force, hydraulic pump with storage tank and bleed mechanism.</p> <p>Required dimensions of the Items: Pressure Piston: diameter: 12mm. Measuring range; pressure: 0-2.5bar.</p>
3	Hydrostatic pressure	01	<p>Required features in the experimental setup: investigation of the hydrostatic pressure in fluids at rest, tiltable water tank with fill level scale, lever arm with different weights.</p> <p>Required dimensions of the Items: Water tank; inclination angle: 0°-90°, Lever arm; max. Length 250mm.</p>
4	Flow Over Weirs	01	<p>Required features in the experimental setup: Discharge measurement and coefficient of discharge for each type of weirs/notches, Measuring notches for installation in the experimental flume of hydraulic bench</p> <p>A rectangular weir notch Two triangular or V notch having included angles of 90 degree and 60 degree. Level gauge with scale for determining the head: measuring ranges 0-200mm level gauge can be positioned anywhere along the experimental flume</p>
5	Metacentric Height apparatus	01	<p>Required features in the experimental setup: investigating the stability of a floating body and determining the metacenter, transparent floating body with rectangular frame cross-section, one horizontally movable clamped weight for adjusting the heel, one vertically movable clamped weight for adjusting the center of gravity, clinometer with scale for displaying the heel, other floating bodies with different shapes of frame, determination of the metacenter of 2 floating bodies with different frame shapes, 1 shape of frame: hard chine, 1 shape of frame: round bilge.</p> <p>Required dimensions of the Items: Floating body; LxWxH: 300x130x190mm, mast height: 400mm. Clinometer scale: +/- 35°. Tank for water: 50L. Hard chine frame: LxWxH 300x200x140mm, mast length: 240 mm Round bilge frame: LxWxH 300x200x100mm, mast length: 240mm.</p>
6	Demonstration of Bernoulli's Theorem	01	<p>Required features in the experimental setup: familiarization with Bernoulli's principle, Venturi nozzle with transparent front panel and measuring points for measuring the static pressures, axially movable Pitot tube for determining the total pressure at various points within the Venturi nozzle, 6 tube manometers for displaying the static pressures, single tube manometer for displaying the total pressure.</p> <p>Required dimensions of the Items: Venturi nozzle; A: 84-338mm², angle at the inlet: 10.5°, angle at the outlet: 4°, Pitot tube; movable range: 0-200mm, diameter: 4mm. Pipes and pipe connectors: PVC, Measuring ranges; static pressure: 0-290mmWC, total pressure: 0-370mmWC.</p>

7	Demonstration of Impact of Jet	01	<p>Required features in the experimental setup: investigation of jet forces and demonstration of the principle of linear momentum, tank made of transparent material for observing the experiments, nozzle for generating the water jet, jet force adjustable via flow rate, four different shaped deflectors: (flat surface, oblique surface, semi-circular surface, conical surface), measurement of the jet forces via weight-loaded scale.</p> <p>Required dimensions of the Items: Tank; inner diameter: 200mm, height: 340mm. Nozzle; diameter: 10mm. Deflector; flat surface: 90°, oblique surface: 45°/135°, Semi-circular surface: 180°, conical surface: 135°.</p>
8	Orifice tank Discharge for Basic and Advanced Orifice Studies	01	<p>Required features in the experimental setup (complete with all necessary accessories and instruments to perform the experiment): Basic orifice tank with a set of three circular orifice Advanced orifice: a set of four orifices each mounted in a threaded orifice holder</p> <ol style="list-style-type: none"> Borda mouthpiece Bell mounted orifice Triangular shaped orifice Square shaped orifice
9	Energy Losses in Pipes	01	<p>Required features in the experimental setup : Investigation of pressure losses in piping elements and shut-off devices, different measuring objects for determining flow rate according to the differential pressure method. Pipe sections capable of being individually shut off, with different piping elements: sudden contraction, sudden enlargement, Y-pieces, T-pieces, corners and bends, one pipe section to hold interchangeable shut-off/measuring objects, measuring objects made of transparent material: Venturi nozzle, orifice plate flow meter and measuring nozzle, shut-off devices: angle seat valve, gate valve, annular chambers for measurement of pressure without interaction, 2 twin tube manometers for measuring the pressuredifference. Setup should cover advanced studies of piping system. Complete with all necessary accessories and instruments to perform the experiment.</p>
10	Flow Meter Demonstration	01	<p>Required features in the experimental setup : different methods of flow rate measurement, measuring instruments: orifice plate flow meter/measuring nozzle, Venturi nozzle and rotameter, 6 tube manometers to determine the pressure distribution in Venturi nozzle, orifice plate flow meter and measuring nozzle, measurement of the total pressure with Pitot tube.</p> <p>Required dimensions of the Items: Venturi nozzle: A=84-338mm², angle at the inlet: 10.5°, angle at the outlet: 4°. Orifice plate flow meter: diameter r=14mm. Measuring Nozzle: diameter=18.5mm. Rotameter: max. 1700L/h. 6 tube manometers</p>
11	Demonstration of Free and Forced Vortices	01	<p>Required features in the experimental setup: generation and investigation of vortices, transparent tank allows visualization of vortex formation, two nozzles for radial water supply (free vortex), two nozzles for tangential water supply (forced vortex), different inserts for the water drain to generate free vortex, impeller for generating a forced vortex, point gauges detect the surface profile.</p> <p>Required dimensions of the Items: Tank; diameter: 250mm, height: 190mm. 4 inserts for the water drain, Impeller with 3 blades,</p>
12	Pressure Surge in a Pipe	01	<p>Required features in the experimental setup: Unit designed to work with hydraulics bench to demonstrate the phenomena of pipe surge and water hammer. The apparatus includes two separate test pipes, a surge header tank and surge tube, a hammer inlet and hammer fast acting valve. Two pressure transducers provide electrical signals for connection to a digital oscilloscope (for use with users PC).</p>
13	Hydrostatic Bench	01	<p>Required features in the experimental setup: Independent and self-contained unit for the study of fundamental properties of non-moving Fluids like density, relative density, pressure variation with head, hare's tube, Pascal's law, viscosity, capillary, surface tension, Archimedes, Vernier level gauge and hydraulic press.</p>
14	Osborne Reynolds Experiment	01	<p>Required features in the experimental setup: visualization of laminar and turbulent flow in the Osborne Reynolds experiment, water as flowing medium and ink as contrast medium, vertical glass pipe section, water tank with glass beads to stabilize the flow, flow rate in the pipe section can be adjusted via a valve. Required dimensions of the item or features: Water tank; capacity: 2200mL. Pipe section; length: 675mm, inside dia. meter: 10mm, Tank for ink; capacity: approx. 250mL.</p>

15	Hele Shaw apparatus	01	<p>Required features in the experimental setup: Based on the well-known Hele Shaw experimental method. This unit provides a parallel laminar water flow field to allow a full study of the low Reynolds number flow patterns around submerged models representing cylinder, aero foils, bluff bodies, knife edge weirs etc. or through various passages such as valve bodies, nozzles etc. Four independently controlled sinks and sources permit the study to be extended to more complex problems involving fluid removal or addition at discrete points in the potential flow. The apparatus is equipped with multiple dye injection to provide flow visualization. Alternative passage and submerged models can be easily cut from the flexible sheet material supplied. A supply of de-aerated water improves the quality of the experiment</p>
16	Advanced Multi-Purpose Teaching Flume (10meters)	01	<p>Required features in the experimental setup: basic principles of open-channel flow, experimental flume with experimental section, inlet and outlet element and closed water circuit, length of the experimental section 10m, smoothly adjustable inclination of the experimental section, side walls of the experimental section made of tempered glass for excellent observation of the experiments, all surfaces in contact with water made of corrosion-resistant materials, flow- optimized inlet element for low-turbulence entry into the experimental section, closed water circuit with water tank, pump, flow rate sensor and manual flow adjustment. With inclinometer and surface profile measuring instruments for Chezy equation and Manning's friction factor. Experimental section; length: 10m, flow cross-section not less than WxH: 400 x 500 mm, with appropriate inclination adjustment. Accessories: Broad-crested weir, ogee-crested weir, sluice gate, Siphon weir, Elements for energy dissipation, venturi flume, wave generator, parshall flume, culvert, instrument carrier, Measuring instruments: Level gauge, Pitotstatic tubes, velocity meter, digital level gauge, multi tube manometers</p>
17	Apparatus for Turbine Experiments	01	<p>(a) Pelton Turbine, required features in the experimental setup: Operating Principle of a Pelton Turbine, function of a Pelton turbine, transparent front panel for observing the operating area, loading the turbine by use of the band brake, adjustable nozzle needle for setting different nozzle cross-sections, marking on brake drum for non-contact speed measurement, instruments: spring balances for determining the torque, manometer shows pressure at turbine inlet. Required dimensions of the Items: Pelton turbine; output: 5W at 500min⁻¹, approx. 30L/min, H=2m. , Pelton wheel; 14 blades, blade width: 33.5mm, external diameter: 132mm. Needle nozzle; jet diameter: 10mm. Measuring ranges; braking force (spring balance): 10N, pressure:0-1bar</p> <p>(b) Francis Turbine, Required features in the experimental setup :Operating Principle of a Francis Turbine, function of a Francis turbine, transparent front panel for observing the operating area, loading the turbine by use of the band brake, adjustable guide vanes for setting different angles of attack, marking on brake drum for non-contact speed measurement, instruments: spring balances for determining the torque, manometer shows pressure at turbine inlet. Required dimensions of the Items: Turbine; output: 12W at 1100min⁻¹, approx. 40L/min, H=8m, rotor-7 blades, blade width: 5mmexternal diameter: 50mm. guide vanes: 6 vanes, adjustable (20 stages). Measuring ranges: braking force (spring balance): 10N, pressure:0-1.0bar.</p> <p>(c) Kaplan Turbine, Required features in the experimental setup: Operating Principle of a Kaplan Turbine, function of a Kaplan turbine, transparent front panel for observing the operating area, loading the turbine by use of the band brake, adjustable guide vanes for setting different angles of attack, marking on brake drum for non-contact speed measurement, instruments: spring balances for determining the torque, manometer shows pressure at turbine inlet. Required dimension of the item: Turbine; output: 12W at 1100min⁻¹, approx. 40L/min approx.</p>
18	Experimental Setup for Series and Parallel Pumps	01	<p>Required features in the experimental setup for Series and Parallel Configuration of Pumps: Investigation of series and parallel configuration of pumps, two identical centrifugal pumps, transparent tank as intake tank, and overflow in the tank ensures constant suction head, ball valves used to switch between series and parallel operation, manometers at inlet and outlet of each pump. Required dimensions of the Items : 2x centrifugal pump, power consumption: 370W, max. Flow rate: 21L/min,</p>

19	Multi-Pump Test Rig	01	Required features in the experimental setup: Self-contained multi-pump rig for the detailed investigation on both rotodynamic and positive displacement pumps. The test set is to be supplied with a positive displacement gear pump as standard and to be able to accept the following range of pumps, positive Displacement piston pump, positive displacement vane pump, rotodynamic centrifugal pump, rotodynamic axial pump, rotodynamic channel impeller pump.
20	Boundary layer Plate	01	Required features in the experimental setup: An apparatus for the experimental study of the thickness of the boundary layer, where fluid flow meets a stationary surface and investigate the velocity profile within the layer. Complete with all necessary accessories and instruments.
21	Permeability apparatus with drainage and seepage tank	01	Required features in the experimental setup: An apparatus for the experimental study of flow through a permeable media. with Foundation pressure plate, straight and curved permeable membranes and tile drain (with complete instrumentation for lab experimentation). A facility for the study of flow line visualization, determination of seepage rates, flow net construction, verification of Darcy's law, seepage under dams, abstraction from wells and hydrostatic forces exerted on bridge Foundations. Complete with all necessary accessories and instruments. Models : Foundation model, sheet pile model, dam model
22	Advanced hydrology study and Rainfall apparatus	01	Required features in the experimental setup: A self-contained floor standing apparatus with complete instrumentation for hydrology and Fluvial geomorphology demonstrations, basin hydrology cycles, flood & runoff hydrographs, effects on bridges/dams, interaction of adjacent wells and elementary fluvial processes like erosion on hillsides and river meander. Comprising of a 2m x 1m stainless steel tank and flow meters with range 2.5 l/min to 8 l/min. Complete with all necessary accessories and instruments.
23	Sediment Transport Demonstration Channel	01	Required features in the experimental setup: An apparatus for the demonstration of full range of forms that arise in a mobile bed as the flow rate and/or slope is varied. With study of the movement of sediment around structures for sourcing and blockage. Complete with all necessary accessories and instruments.
24	Visualization of streamlines in an open channel	01	Required features in the experimental setup: experimental unit for visualization of various flow processes, illuminated flow section with transparent front panel, open-channel flow demonstrated on 2 weirs, flow through demonstrated with 3 differently shaped models, flow around solid bodies demonstrated on four drag bodies, contrast medium: ink, optional operation via laboratory supply or as closed water circuit. Dimensions of the Items: Flow section: approx. 5L, Contrast medium: ink. Injection of the contrast medium; 5 nozzles. Pump; flow rate: 10L/min, head: 5.7m. Weirs; broad-crested, sharp-crested. Drag body; 2 cylinder cross-sections, aerofoil, symmetrical aerofoil, asymmetrical. Models (different shapes), gradual contraction / sudden enlargement, sudden contraction/ Enlargement, tube bundle.
25	Demonstration infiltration apparatus	01	An apparatus for the demonstration of infiltration processes. It consists of three graduated Perspex cylinders, resting on a permeable support screen, complete apparatus is supported by a metal stand or bench mounted (with complete accessories for lab performance). Complete with all necessary accessories and instruments.
26	Irrigation displays	01	Irrigation Displays. Set of three units covering trickle and micro systems; sprinkler irrigation with real components. Surface irrigation systems with models. Supplied with an instruction manual.
27	Pipe friction for laminar / turbulent flow	01	measurements of the pressure loss in laminar flow, measurements of the pressure loss in turbulent flow, determining the critical Reynolds number, determining the pipe friction factor, comparing the actual pipe friction factor with the theoretical friction factor Investigation of the pipe friction in laminar or turbulent flow transparent tank with overflow ensures constant water inlet pressure in the pipe section for experiments with laminar flow water supply via hydraulic bench or via laboratory supply for experiments with turbulent flow. Flow rate adjustment via valves twin tube manometers for measurements in laminar flow dial-gauge manometer for measurements in turbulent flow. Flow rate determined by hydraulic bench. Water supply using hydraulic bench.
			Total Estimated Cost = 30.10 Million PKR

Note:

- 1. All items must be of USA, Japan, Germany, UK, France, Italy, Belgium, Netherland, Finland, Switzerland & Sweden's Manufacturer.**
- 2. Quoted hardware must be compatible with lab power supplies and other equipment as per requirement.**
- 3. Equipment shall be delivered with all necessary supplies and accessories required for installations and start-up.**
- 4. The vendor shall demonstrate and document upon installation that the system meets all performance specifications.**
- 5. Comprehensive documentation including Safety/Installation Guidelines and Operation/Experiment Manuals should accompany the product, both in Hard and Soft/CD/eBook formats for all items.**
- 6. All items (1-23) of this lab will be technically & financially evaluated as a group. But the bidders are still required to quote individual prices of the items.**
- 7. Items (24-27) will be technically & financially evaluated as separate/individual item.**

TENDER B: ENGINEERING MECHANICS LABORATORY

Sr.	Items	Qty.	Specifications
1	Friction on an Inclined Steel Plane	01	Required features in the experimental setup: experiment relating to friction on the inclined plane, inclined plane with plastic coating, drag link with angle scale and ball bearing-mounted deflection roller, angle of plane adjustable, 2 samples, graduated weight set, Friction body, dead-weight force: each 10N, 1x steel / polypropylene, 1x aluminum / brass), Inclined plane (Specs; length: 1000mm, adjustable angle range: $\pm 45^\circ$), Weights
2	Shearing Force Apparatus	01	Required features in the experimental setup: investigation of shear force on beam mounted on 2 supports, measurement of shear force in beam by low-friction hinge with 1 degree of freedom, position of hinge at 1/3 span, 2 bearing supports, loading of beam by 1 to 3 point loads, force gauge to indicate shear force, adjusting nut for horizontal alignment of beam, storage system to house the components. Specimen; (diameter x l: 6x26mm, made of electrical grade copper).
3	Bending Moment Apparatus	01	Required features in the experimental setup: investigation of bending moment on beam mounted on 2 supports, indication of bending moment in beam by low-friction hinge with 1 degree of freedom, position of hinge at 1/3 span, 2 bearing supports, loading of beam by 1 to 3 point loads, force gauge and lever arm to indicate bending moment, adjusting nut for horizontal alignment of beam, storage system to house the components, Dimensions of items: Beam; (total length: 1000mm, span: 800mm), Bending moment measuring range: 10Nm, Weights
4	Centrifugal Force Apparatus	01	Required features in the experimental setup: measure the centrifugal force on rotating masses, adjustment of the orbital radii, selection of different masses, continuous adjustment of the speed, drive with DC motor, transmission of centrifugal force via the connecting rod and member to a bending beam, force-proportional deformation of the bending beam, measure the centrifugal force via an inductive position transducer on the bending beam, digital display of force and speed, protective cover with electronic coupling to the drive ensures safe operation. Dimensions of items: Orbit, Masses; Drive motor; (max. power: 35W, max. speed: 6000min^{-1}), Measuring ranges; (speed: $0 \dots 500\text{min}^{-1}$, force; (0-25N, resolution 0.1N).
6	Setup for Deformation of frames with mounting Frame	01	Required features in the Mounting Frame; frame for mounting of experiments in statics, strength of materials and dynamics, sturdy sectional steel double frame(welded), easy & exact mounting of all components by precision clamp fixings, stable on laboratory desktops or workbenches, frame supplied disassembled. Dimensions of items: Mounting frame made of steel sections (frame opening WxH: 1250x900mm, section groove width: 40mm). Required features in the Deformation of frames setup; investigation of the deformation of steel frames under load, 1 U-shaped and 1 S-shaped frame, statically determinate or statically indeterminate bearing support possible, 1 long and 1 short clamping pillar, roller bearing for statically indeterminate support, weights with a movable hook to adjust to any load application point, dial gauges record the deformation of the investigated frame under load, storage system to house the components. Dimensions of items: Frame made of steel (edge length: 600mm, cross-section: 20x10mm, U-shaped: 600x600mm, S-shaped: 600x600mm), Dial gauges: (measuring range: 0-20mm, graduation: 0.01mm), Weights:
7	Hook's Law Apparatus	01	Required features in the experimental setup: experiments relating to Hook's law and oscillation experiments on a spring-mass system, metal stand with integral scale, 2 helical spring as tension springs, tension springs configured in series or singly, load applied to tension spring by weights, storage system to house the components. Dimensions of items: Helical spring short; (coils: 53, $\varnothing = 18,3\text{mm}$, wire diameter: $\varnothing = 1,0\text{mm}$), Helical spring long; (coils: 109, $\varnothing = 18,3\text{mm}$, wire diameter: $\varnothing = 1,0\text{mm}$), Scale graduation: 1mm, Weights;
8	Experimental setup for Forces in Truss	01	(a) Experimental setup for Forces in various single planetrusses. Required features in the experimental setup: investigation of bar forces in a statically determinate truss, construction of various trusses possible, 2 supports with node disks, load application device with force gauge mountable on different node disks, measuring points to measure force on each bar, storage system to house the components. Dimensions of the Items; Bars: 19 (2 bars 150mm, 5 bars 259mm, 7 bars 300mm, 1 bar

	Experimental setup for Forces in Truss	01	<p>397mm, 3bars 424mm, 1 bar 520mm), angle between bars: (30°, 45°, 60°, 90°), maximum bar force: 500N, measuring points on each bar, height of truss max. 450mm, length of truss max. 900mm, Load application device; ±500N& graduation: 10N</p> <p>(b) Experimental setup for Forces in an over-determinatetruss.</p> <p>Required features in the experimental setup: investigation of bar forces in statically over-determinate trusses, surplus bar, longitudinally adjustable, straight and inclined loading possible, load application device with force gauge mountable on different node disks, measuring point to measure force on each bar, measuring amplifier, storage system to house the components. Dimensions of items; Bars: 8 (5 bars-fixed 300mm, 2 bars-fixed 424mm, 1 bar-adjustable 400-450mm), angle between bars: (30°, 45°, 60°, 90°), maximum bar force: 500N, measuring point on each bar, height of truss max. 270mm, length of truss max. 500mm, Load application device; ±500N & graduation: 10N, Dial gauge: measuring range: 0-20mm</p> <p>(c) Forces in a Howetruss</p> <p>Required features in the experimental setup: investigation of bar forces in a single plane, statically determinate truss, ready assembled Howe truss, frame for horizontal experimental setup, influence of dead weight minimized by horizontal experimental setup, any straight and inclined load cases possible, fine adjustment of load force, low-friction knife-edge bearing, 2 supports for vertical forces, 1 support for horizontal forces, pre- balanced strain gauge connection box with connection to measuring amplifier. Dimensions of items: Truss: Howe type, bar cross-section: 10x3mm-stainless steel, bar lengths: (115.5, 200, 231mm), external loading: max. 500N, bars: 13-of which 7 with measuring points, Load application device with force gauge; tensile force: max. 600N, stroke: 30mm, Node disks: 8, Angle between bars: (30°,45°).</p> <p>(d) Truss beam: Warren girder</p> <p>Required features in the experimental setup; investigation of bar forces in a single plane, statically determinate truss, ready assembled Warren truss beam, influence of dead-weight minimized by horizontal experiment layout, any straight and inclined load cases possible, pre-balanced strain gauge connection box. Dimensions of items; Truss beam: Warren type, bar cross-section: 10x3mm-stainless steel, bar lengths: (270mm, 186.5mm), tensile force: max. 500N, bars: 13-of which 7 with measuring points, Node disks: 8.</p>
9	Three hinged Arch	01	Three hinged Arch: Experimental setup with a standard test frame for studying three hinged arch with loading and measurement facilities.
10	Deflection of Beams	02	Deflection of Beams: Experimental setup with a standard test frame for studying deflection of beams with loading and measurement facilities.
11	Suspension Bridge	01	Suspension Bridge: Experimental setup with a standard test frame for studying suspension bridge with loading and measurement facilities.
12	Tie and Jib crane apparatus	01	Bench-top, to investigate various crane models with simple force systems. Spring balances in the jib and tie. Both balances are adjustable to maintain apparatus geometry. Loading via a cord, pulley, load hanger and weights
13	Demonstration of Euler Buckling	01	Demonstration of various buckling problems case 1 – fixed-free bar, case 2 – pinned-pinned bar, case 3 – fixed-pinned bar, case 4 – fixed-fixed bar. Understanding the correlation between buckling length, buckling load and various methods of support
14	Universal material tester (20kN)	01	Required features wit data acquisition system: Classic experiments from destructive materials testing, tensile tests, compressive strength test, Brinell hardness test, generation of tensile and compressive forces, forces generated by hand- operated hydraulic system; no power supply required, force gauge, pointer instrument with drag indicator, dial gauge for determining the elongation, materials of hardness specimens: aluminum, copper, steel, brass,

			<p>tensile specimens according to DIN 50125: aluminum, copper, steel, brass. Dimensions of items: Test force: max. 20kN, Stroke: max. 45mm,</p> <p>20 set of Tensile specimens (steel); 20 set of Hardness specimens (steel), Sphere for hardness testing: dia. meter 10mm, Measuring ranges; (force: 0-20kN, graduation: 0. 5kN, displacement: 0-20mm, graduation: 0.01mm); Compression plate device with 20 set compression Specimens (Wood); Devices for single and double shear tests with 20 set of shear specimens</p>
15	Universal material tester (50 kN)	01	<p>Required features: hydraulically operated trainer for materials testing, based on industrial standards, generation of tensile and compressive forces, adjustable test load and travel velocity, generation of test load via gear pump and double-acting hydraulic cylinder, force measurement via a strain-gauge full bridge with acoustic overload signal, max. overload 150%, displacement measurement via linear potentiometer, LED displays for force and displacement with tare and maximum-value storage. Dimensions of items: Operating area, WxH: 300x925mm, Hydraulic generation of the test load (test load: 0-50kN, max. system pressure: 175bar, max. piston stroke: 150mm, traverse velocity: 0-425mm/min, gear pump (max. flow rate: 1cm³/revolution, power consumption: 0.55kW), Measuring ranges; (force: 0-50kN, displacement: 0-150mm), 230V, 50/60Hz, 1 phase operated,</p> <p>Accessories: Tension test: Clamping device for tensile specimens, round and flat, Set of 20 tensile specimens (steel), Clamping device for tensile specimens, threaded end, Set of 20 tensile specimens (Steel), Clamping device for tensile specimens, dumbbell-shaped, Set of 20 tensile specimens, dumbbell-shaped, (steel)</p> <p>Compression Test: Compression plates for compression tests Set of 20 compression specimens, plastic (10), wood (10)</p> <p>Brinell hardness testing: Experimental setup for Brinell hardness tests, Set of 20 hardness specimens (Al, Cu, Steel each)</p> <p>Bending test: Bending test device, Set of 25 bending specimens, (cast iron)</p> <p>Shear test: Device for shear tests, double-shear, Set of 20 shear specimens (Cu)</p> <p>Spring tests: Experimental setup for spring tests, helical spring, Set of 20 helical spring</p>
16	Charpy's Impact Testing Machine	01	<p>Charpy notched-bar impact test with increased work capacity 300Nm. Safety provisions around swing path. Should be supplied with all accessories and 20 set of notched bar impact specimens of stainless steel material.</p>
17	Torsion testing machine	01	<p>Motor-supported torsion tests with different metallic specimens to fracture. Capacity: 200Nm. Measure values displayed and controlled by via touch panel. Transparent protection. Supplied with software, PC and data cable for data acquisition. The machine should be supplied complete with all accessories and 20 set of torsion specimens. Steel (20 Set), Aluminum (20 set)</p>
18	Unsymmetrical bending and shear center apparatus	01	<p>Experimental unit for general and unsymmetrical bending of straight beams</p> <p>Beams: I, L, Z and U profiles (10 each), clamping flange of beam can be clamped in the pillar free to rotate in any direction, clamping flange with angle scale to indicate the angular position of the beam, eccentricity of load application point adjustable 2 dial gauges with bracket to record the horizontal and vertical deformation of the beam under load</p>
19	Universal Hardness tester	01	<p>The machine performs Brinell, Vickers and Rockwell tests in accordance with established specifications: Brinell (ASTM E10), Vickers (ASTM E92), Rock well (ASTM E18)</p> <p>The machine should be supplied complete with all accessories and set of hardness specimens. Steel (20 Set), Aluminum (20 Set)</p>
20	Bearing Friction Apparatus	01	<p>Required features in the experimental setup: comparison of dynamic friction and rolling friction, experiments on rotational dynamics are possible, bearing shells of different materials as slide bearings, steel flywheel (galvanized), drive via cable drum and weights, storage system for parts, bracket for wall mounting. Dimensions of items: Bearing shells as slide bearing, half-shells, Deep-groove ball bearing, Flywheel, Weights, base plate</p>

21	Plastic Bending of Beams	01	Required features in the experimental setup with frame: study a beam until plastic deformation, load on the beam from point load, fixed and movable support for supporting the beam, beams of different materials and profiles, dial gauge for recording the deformation, storage system for parts. Dimensions of items: Beams: (1x 1000x15x3mm, steel), (1x 1000x15x3mm, aluminum), (1x H-profile, 1000x15x15x2mm, aluminum), Load application device: (max. load: 5000N, max. travel: 100mm), Measuring range: 0-50mm.
Local items:			
22	Concurrent force system apparatus	01	For experimentally verifying the laws of triangle, parallelogram and polygon of forces. Comprising of a circular aluminum disc, graduated into 360 degrees. Complete with leveling screws, clamping device to fix the table at any desired angle, five sliding clamp pulleys, central ring, string and five sets of iron. nickel led slotted weights, each set containing weight's and hanger
23	Miscellaneous Demonstration models	01 Set each	Models 1. Column with initial curvature for determining initial imperfection by south-well plot method, 2. Riveted, bolted and welded connections for truss joint (gusset plate connecting truss members), 3. Plate girder, 4. Pre-stressing strands, 5. Beam model (having grid lines) for demonstration of sagging and hogging in beams
			Total Estimated Cost = 34.33 Million PKR

Note:

- a. All items must be of USA, Japan, Germany, UK, France, Italy, Spain, Belgium, Netherland, Finland, Switzerland & Sweden's manufacturer.
- b. Quoted hardware must be compatible with lab power supplies and other equipment as per requirement.
- c. Equipment shall be delivered with all necessary supplies and accessories required for installations and start-up.
- d. The vendor shall demonstrate and document upon installation that the system meets all performance specifications.
- e. Comprehensive documentation including Safety/Installation Guidelines and Operation/Experiment Manuals should accompany the product, both in Hard and Soft/CD/eBook formats for all items.
- f. All items (1-13) of this lab will be technically & financially evaluated as a group. But the bidders are still required to quote individual prices of the items.
- g. Items (14-21) of this lab will be technically and financially evaluated as separate/individual item.
- h. Local items (22-23) of this lab will be technically and financially evaluated as separate/individual item.

TENDER C: HIGHWAY LABRATORY

Sr. No	Equipment Name	Qty.	Specifications
1	Asphalt Laboratory Binder Content	01	Confirming to ASTM D2172 AASHTO T164-A EN 12697-1 1500 g capacity digital centrifuge extractor. Speed control up to 3600 r.p.m. 230V, 50-60Hz, 1ph. Complete with spare bowl, 100 filter discs and necessary accessory. Galvanized sample tray 12"x12"x 2"
2	Sieve analysis	01	Pan and cover 200 mm dia. 200 mm dia. ISO (BS,UNI) sieve op.75 microns 200 mm dia. ISO (BS) sieve op.150 microns 200 mm dia. ISO (BS) sieve op.212 microns 200 mm dia. ISO (BS) sieve op.300 microns 200 mm dia. ISO (BS) sieve op.425 microns 200 mm dia. ISO (BS) sieve op.600 microns 200 mm dia. ISO (BS) sieve op.850 microns 200 mm dia. ISO (BS) sieve op.1,18 mm 200 mm dia. ISO (BS) sieve op.1,7 mm 200 mm dia. ISO (BS) sieve op.2,36 mm 200 mm dia. ISO (BS) sieve op.3,35 mm Sieves Coarse & Fine 300mm Dia S.S. ASTM Seive op (7/2") 89mm 300mm Dia S.S. ASTM Seive op (3") 76mm 300mm Dia S.S. ASTM Seive op (5/2") 64mm 300mm Dia S.S. ASTM Seive op (2") 50mm 300mm Dia S.S. ASTM Seive op (3/2") 38mm 300mm Dia S.S. ASTM Seive op (1") 25mm 300mm Dia S.S. ASTM Seive op (3/4") 19mm 300mm Dia S.S. ASTM Seive op (1/2") 12.5mm 300mm Dia S.S. ASTM Seive op (3/8") 9.5mm 300mm Dia S.S. ASTM Seive No. 4 (4.75mm) 300mm Dia S.S. ASTM Seive No. 8 (2.36mm) 300mm Dia S.S. ASTM Seive No. 16 (1.18mm) 300mm Dia S.S. ASTM Seive No. 30 (0.60mm) 300mm Dia S.S. ASTM Seive No. 50 (0.300mm) 300mm Dia S.S. ASTM Seive No. 100 (0.150mm) 300mm Dia S.S. ASTM Seive No. 200 (0.075mm) 300mm Dia S.S. Pan and Cover Coarse Sieve Shaker Sieve capacity: up to ten 200/203 mm (8"), six 300 mm (12") dia. sieves plus pan and cover, max. sample weight: from 1500 to 4500 g, Orbital action: 300-330 oscillations per min. approx. Jarring action: 37-40 vertical blows per minute Fine Sieve Shaker Sieve capacity: up to six 300 mm (12") dia. sieves plus pan and cover Max. sample weight: from 1500 to 2000g, Orbital action: 300-330 oscillations per min. approx., Jarring action: 37-40 vertical blows per minute

3	Digital thermometer complete with probes	01	Digital Thermometer -50°C to 1000°C. Complete with probes
4	Preparation of Test Specimen for Marshal Test	01	Confirming to ASTM D1559 AASHTO T245 ASTM D6926 Digital Automatic Marshal Compactor (220V-50HZ - 1PH) for 4" dia. and 6" dia. Sample with Hammers and Molds
		04	Standard Proctor Mould
		04	Modified Proctor Mould
		01	Paper Disc for Marshal Sample (Pack of 100)
		01	Confirming to EN 196-3 EN 459-2 EN 413-2 EN 196-1 EN ISO 679 EN 480-1. Digital Mortar mixer complete with stainless steel beater and bowl 5 liter capacity. 230V, 50Hz, 1ph.
		01	Heating mantle for 5 liter capacity. Bowl. 230V, 50-60Hz, 1ph.
		01	Universal Extender for 4" and 6" Dia. sample
		01	Digital water bath 30 liter capacity. 230V, 50-60Hz, 1ph.
5	Marshal Test	01	Confirming to ASTM D1559 ASTM D5581 AASHTO T245 ASTM D6927 50 kN maximum capacity, suitable for testing 4" and 6 " dia. specimens High precision load rings fitted with 0.001 mm resolution gauge conforming to standards.
6	Cleveland Flash Point apparatus	01	Confirming to EN 22592 ASTM D92 It consists of a brass cup mounted on an electric heater with temperature controller. Conforming to the CE European directive, is supplied complete with double line-fuse, hot plate control system and thermometer -6 +400°C.
7	Ash content apparatus	01	Confirming to EN 1367-5 EN 196-2 EN 459-2 EN 12697-1 Muffle furnace, 1100°C max temperature. 230 V, 50-60 Hz, 1 ph and Stainless steel oven tongs
8	Penetration Test	01	Semiautomatic digital penetrometer with micrometer vertical adjustment and digital penetration measurement. 230V, 50-60Hz, 1ph.
		01	Saybolt thermometer 19-27° C
		01	Transfer dish with support
		01	Sample cup dia. 55x35 mm. Kit of 6.
		01	Aluminum cup dia. 70x45 mm. Set of 6
		01	Verified penetrometer needle
		01	Penetrometer needle. Set of 3
		01	Water temperature controller for penetration test, complete with heating and cooling controller. 230V/50-60Hz/1ph
9	Water Content apparatus	01	Confirming to AASHTO T48 EN 1428 ASTM D244 AASHTO T55 AASHTO T59 Water in bituminous material test set (Dean-Stark) 230V/50-60Hz/1Ph
		01	Glass receiver 10 ml capacity
		01	Distillation flask 500 ml
		01	Glass condenser
		01	Confirming to AASHTO T48 EN 1428 ASTM D244 EN 12847 Water in bitumen emulsion test set

		01	Glass receiver 25 ml capacity
10	Softening point apparatus	01	Ring and ball apparatus confirming to EN1427 and ASTM D36 Hot plate with protection device
11	Oven	01	Digital Thermostatically Controlled General purpose Laboratory Oven Nominal capacity : 400-450 liters; Max. temperature : 180-200°C
12	Thermometer	01	Digital Dial Thermometer Range 0 to 300°C with collar
13	Digital Balances	01	420g x 0.001g resolution digital balance, under balance weighing facility, battery [rechargeable] and mains operated. Complete with calibration certificate.
		01	600 g capacity. x 0.01g resolution, digital balance, under balance weighing facility, RS 232 serial output, battery [rechargeable] and mains operated, Complete with traceable calibration certificate. 230-110V/50-60Hz/1ph, adapter included
		01	Top pan digital balance 16kg capacity x 0.5g. Battery operated with mains adaptor.
		01	Digital Electronic Balance , Capacity 30kg, Resolution: 1gram
14	Sample splitter	02	Sample Splitter with opening 30mm
		02	Sample Splitter with opening 50mm
15	Hot plate for bitumen	02	Hotplate with Jar and stirrer for bitumen sample
16	Apparatus for Specific gravity of bitumen	02	Consist of pycnometer, water bath, thermometer, balance
17	Skid resistance meter	01	Skid resistance and friction test set with complete accessory (Skid tester) conforming to ASTM E303 standard, including additional scale for PSV, 3 rubber sliders for site use, thermometer, washing bottle, tool set with case for machine assembly, rule, carrying case and traceable certificate of conformity to ASTM E303
18	Ductility apparatus for bitumen	01	Confirming to EN 13398 ASTM D113 AASHTO T51 ASTM D6084. Ductility testing machine. 4 briquettes capacity, 1500 mm carriage travel, 5 to 100 mm/min adjustable testing speed with complete accessory to perform experiment.
19	Saybolt viscometer	01	Containing two tubes, to find viscosity of bitumen.
20	Asphalt mixture	01	Automatic laboratory mixer, 30 liters capacity.
21	Water bath	01	With cooler unit, Capacity 40 liters, Power 2000W, Temperature Range: 5-60°C, Accuracy upto $\pm 1\%$
Local items			
22	Sieve Brush	20	Sieve Brush
23	Spatula 200mm	20	Stainless steel Spatula 200mm
24	Aluminum Scoop	20	Round Scoop (5kg) stainless steel
25	Heat Resistive Gloves	20	Heat Resistive Gloves
26	Laboratory cart (Single shelf)	08	Used for laboratory material transport. Constructed in steel with rubber wheels mounted on bearings. Single shelf with size (1025 x 600mm), weight 50 kg. approx.
27	Laboratory cart (Double shelf)	08	Used for general use. Double shelf with size 800x400 mm, weight 20 kg. Constructed in steel with rubber wheels mounted on bearings.
			Total Estimated Cost = 9.84 Million PKR

Note:

1. All items must be of USA, Japan, Germany, UK, France, Italy, Spain, Belgium, Netherland, Finland, Switzerland & Sweden's manufacturer.
2. Quoted hardware must be compatible with lab power supplies and other equipment as per requirement.
3. Equipment shall be delivered with all necessary supplies and accessories required for installations and start-up.
4. The vendor shall demonstrate and document upon installation that the system meets all performance specifications.
5. Comprehensive documentation including Safety/Installation Guidelines and Operation/Experiment

Manuals should accompany the product, both in Hard and Soft/CD/eBook formats for all items.

- 6. All items (1-21) of this lab will be technically & financially evaluated as a group. But the bidders are still required to quote individual prices of the items.**
- 7. Local items (22-27) of this lab will be technically & financially evaluated as a group. But the bidders are still required to quote individual prices of the items.**

TENDER D: SOIL/GEOTECHNICALLABRATORY

Sr.	Items	Qty.	Specifications
1	Heavy Duty pocket Penetrometer	01	Range of 0 to 10 kgf/cm ² (0-980 kPa) and constructed of stainless steel with three interchangeable tips: 4.5 mm, 6.35 mm and 8.98 mm diameter. The penetration stem allows relatively deep penetration into the soil (up to 6 cm), Dimension 20 x 210 mm approx... Supplied complete with plastic case.
2	Standard Pocket Penetrometer	01	With a range of 0 to 5 kgf/cm ² (0-490 kPa), designed for measuring field classification values for cohesive soils. Dimensions 20 x 170 mm approx...
3	Liquid Limit Apparatus	10	With ebonite base and removable brass cup. The height of drop of the cup may be adjusted via the hand crank mechanism. A built-in blow counter is supplied as standard. Dimensions: 150 x 150 x 120 (h) mm. Weight: 3 kg. Included Accessory: Grooving Tool, Spatula 100 mm blade, Spatula 200 mm blade Supply and Installation in fully functional condition along with full accessories
4	Digital Laboratory Oven	02	Digital general purpose Oven, 240 Liters Capacity, Zinc Plated, Forced Ventilation. Upto 400°C, 220V, 50Hz, 1ph Supply and Installation in fully functional condition along with full accessories.
5	Dynamic Penetrometer	01	Standard: DIN 4094, Motor operated dynamic penetrometer, 20 to 30 kg drop weight and 20 cm drop height , a four-stroke engine (1.9 kW) which drives through a flexible shaft, 10 rods; 5 cones each of 500 and 1000 mm ² sizes and a rod lifting device. Accessories: Sounding rod 22 mm dia, Grooved rod 22 mm dia, Tripod for hanging lift mechanism. Treaded nipple M16 Allen type and others
6	Shrinkage Limit Apparatus	10	Porcelain Evaporating Dish 160 mm diameter. Shrinkage Dishes, 45 mm diameter (2 pcs). Glass Cup, 60 cc. PERSPEX Prong Plate. Glass Graduated Cylinder, 25 cc and Spatula with blade 33 x 120 mm. Plastic Carrying Case. Supply and Installation in fully functional condition along with full accessories
7	Specific Gravity Apparatus	10	Glass Pycnometer (For sands and fine aggregates, 1000 cc capacity with conical top). Specific gravity bottles of 25 ml, 50 ml and 100 ml each. Sand Absorption Cone and Tamper (For fine aggregates Chrome-plated brass cone) and tamping rod. Evaporating dish 150mm dia x 45 mm depth. Supply and Installation in fully functional condition along with full accessories.
8	Plastic Limit apparatus	10	Glass Plate 30 x 30 x 1 cm. Porcelain Dish, 160 mm diameter. Spatula with blade 200 mm. Aluminum Moisture cans 83 cc, 55 mm dia. x 35 mm (6 pieces). Plastic Carrying Case with Rod Comparator. Supply and Installation in fully functional condition along with full accessories
9	Water Bath	01	Water bath with 2 channels thermoregulatory (Heating and cooling), submersed recirculating pump and cooler unit. 230 V, 50-60 Hz, 1 ph, Capacity of 40 L and accuracy of -1 to +1 %
10	Digital balance	05	Digital balance, under balance weighing facility, RS 232 serial output, 4210 g cap. 0.01g resolution. Rechargeable battery and mains operated, complete with DKD calibration certificate. 230 V, 50 Hz, 1ph
11	Sieve Analysis apparatus	01 set each	Standards: ASTM E 11, BS 410, EN 933-2, ISO 565, ISO 3310 Set of sieves with 200 mm dia cover and pan with Sieve opening (mm): 0.075,0.15, 0.212, 0.3, 0.425, 0.6, 0.85, 1.18, 1.70, 2.36 & 3.35 mm Set of sieves with 300 mm dia cover and pan with Sieve opening (mm): 5, 6.3, 10, 14, 20, 37.5, 50, 63 & 75 mm
12	Sieve shaker	02	Electromagnetic sieve shaker with compact and robust design for sieves up to a maximum diameter of 315 mm. Vertical, lateral and rotational movements assure efficient sieving in the laboratory. Particularly suited for accurately sieving very fine aggregates. Houses up to 12 sieves diameter 200 mm plus pan and cover or 10 sieves diameter 300 mm plus pan and cover. Timer from 0 to 20 minute. Variable vibration intensity. Adjustable sieving modes: continuous or intermittent. Sieving duration and pauses are programmable. Power supply: 230 V, 50-60 Hz, 1 phase. Dimensions: 380 x 440 x 1080 (h) mm. Weight: 65 kg. Supply and Installation in fully functional condition along with full accessories
13	Top pan Digital balance	05	Top pan digital balance with 4100 g cap. 0.01g resolution. Rechargeable battery and mains operated,

14	Hydrometer Analysis apparatus	10	<p>Standards: ASTM D422, AASHTO T88, The bath is divided into two compartments, the first measures 49 x 29 x 30 (h) cm and is where the sedimentation cylinders are placed, the second is smaller and houses the heater and the circulation pump. The heater is preset to maintain a temperature of 20 ±1°C if the ambient temperature is lower than 20°C. Power: 230 V, 50-60 Hz, single phase, 300 W. Dimensions: 600 x 300 x 380 (h) mm and Weight: 12 kg.</p> <p>High Speed Stirrer Heavy aluminum casting, complete with a removable stainless steel dispersion cup. Speed: 10,000 rpm. Cylinder, 1000 ml Rubber Bung, 1000 ml Soil Hydrometer, 152/H and Hydrometer 151/H .Thermometer, Glass (-30 +50C) Sodium Hexametaphosphate, 1 kg Beaker. Supply and Installation in fully functional condition along with full accessories.</p>
15	Standard Proctor Test apparatus	15	<p>Standard Proctor Mould, 4" Diameter 4" x 4.584" (Capacity 1/30 cu.ft) With Collar and Base Plate. Standard Proctor Rammer Weight 5.5 lb (2.495 kg). 12" (304.8 mm) drop. 2" Diameter.</p> <p>Supply and Installation in fully functional condition along with full accessories.</p>
16	Modified Proctor Test apparatus	15	<p>Modified Proctor Mould, 6" Diameter 6" x 4.584" (Capacity 1/13.33 cu.ft). With Collar and Base Plate. Modified Proctor Rammer Weight 10 lb (4.535 kg). 18" (457.2 mm) Drop. 2" Diameter.</p> <p>Supply and Installation in fully functional condition along with full accessories.</p>
17	Soil Chemical analysis apparatus	02 each	<p>Chloride content:Quantab chloride titrators can be used for estimating the chloride content of aqueous solutions. Two models: Quantab chloride titrator, type 1175, range 0.005% to 0.1% NaCl Pack of 40 strips AND Quantab chloride titrator, type 1176, range 0.05% to 1% NaCl Pack of 40 strips, Weight: 10 g (approx)</p> <p>Sulphate Test: Sulphate test strips, detection range 200 to 1600 mg/l Pack of 100. Useful for the preliminary assessment of sulphate ions in aqueous solutions Weight: 10 g (approx).</p> <p>Accessories: Measuring cylinders Of 250ml and 500 ml, Volumetric flask 1000ml</p>
18	CBR Digital / Automatic proctor	01	<p>Standards: ASTM D 1883, AASHTO T 193, UNI 10009, BS 1377. 230V, 50Hz, 1ph.For automatic compaction of 100 to 102 mm,150 to 152.4 mm, 4" and 6" dia. moulds. Including rammer 2495/4535 g with double inter-changeable tip 50.8 mm circular face for 4" dia.and sector face for 6" dia. moulds along with collar and perforated base. Whatman Filter paper 15 cm (pack of 100) Selectable rammer drop: 300, 305, 450, 457 mm. Blow rate: 30 blows/min Power: 900W.Automatic control of compaction cycles conforming to ASTM/AASHTO. Protection guards for operator safety (CE) Digital touch button console Unique hammer lifting device to guarantee correct drop height Modern and reliable design to ensure long working life. Noise reduction cabinet.</p> <p>Soaking Tank (stainless steel), Size 3ft x 5ft (1 No.) Swell Plate (Brass) 6Nos. Surcharge Weight (Anular) with CBR test (6Nos.) Surcharge Weight (Slotted) with CBR Test (6Nos.) Aluminum Tripod Attachment with CBR test (6Nos.) Spare Disc with CBR test (2Nos.) Penetration / Swell Dial gauge 10mm x 0.01mm (6Nos.)</p>
19	Digital Balance	02	<p>Top pan digital balance with 30 kg cap. And 01g resolution. Rechargeable battery and mains operated.</p>
20	Bench Compression testing machine.	01	<p>Bench compression testing machine with motorized ram, two-column structure and adjustable crossbeam. Loading capacity: 50kN Clearance between columns: 270mm Test speed: 1.27 mm/min, Ram travel: 120mm, Power rating: 300W, Complete with load ring 50kN capacity with 0.001mm resolution dial gauge [strictly conforming to The Standards], CBR piston and penetration depth gauge. 230V, 50Hz, 1ph</p>

21	Direct Shear test Apparatus.	01	<p>Standards: ASTM D3080, AASHTO T236, BS 1377:7 Direct/residual shear machine, digital control of speed and data acquisition. 110-240V, 50-60Hz, 1ph. Microprocessor controlled drive, Large 240x120 pixel display, Test speed, travel and cycles programmable by the keyboard, Rapid approach and automatic positioning. Infinitely variable speed drive from 0.00001 to 11.00000 mm/min. Possibility to set different speed and travel (forward & reverse) in the residual shear tests. Three analogical channels: one for load cell and two for displacement transducers, 130000 point resolution. Different protocol of data downloading to PC through RS 232 serial port. Cycles: up to 9(forward & reverse). Shear box housing made of high resistance. Techno-polymeric material. Maximum shear force: 5000 N. Maximum vertical load: 500 N/ 5000 N using the 10:1 lever loading device supplied with the machine Horizontal displacement: adjustable via firmware up to 19 mm.</p> <p>Accessories: 2000 N load ring complete with adapters for shear machine, Shear box for square specimen 60x60 mm, Sample cutter for 60mm square samples, Extrusion dolly for 60mm square samples, Set of slotted steel weights tot.37.5kg: 2x0.250kg; 2x0.500kg; 2x1kg; 3x2kg; 3x4kg; 2x8kg.</p>
22	Constant Head Permeability Apparatus	01	<p>Standards: ASTM D2434, AASHTO T215, BS 1377:5, Constant head permeability cell, 75mm internal diameter, 3 take-off points, Transparent plastic cell body, Anodised Aluminum upper and lower plates, Manometer stand with 3 manometer tube, The metal stand comprises 3 constant bore tubes, a meter scale, nipples and connecting tubing Dimensions: 1150 x2 00 x 50 mm. Constant level tank of acrylic glass complete with inlet, outlet, overflow, connecting tubing for the cell and attachment for wall mounting. Dimensions: 250 x 155 x 160 mm. Tamping rod, 8 mm diameter x 300 mm height. Supply and Installation in fully functional condition along with full accessories.</p>
23	Falling Head Permeability Apparatus	01	<p>Standards: ASTM D2434, AASHTO T215, BS 1377:5 Falling head permeability cell, 100 mm internal diameter Complete with 75 micron gauze and 2 m of tubing. Manometer stand, with 4 glass manometer tubes, 1500 mm long, of 21, 12, 5 and 3 5 mm internal diameter Back panel dimensions: 1680x 280 mm</p> <p>Soaking reservoir, made from plated steel, complete with overflow tube Dimensions: 230 mm diameter x 230 mm height. Vacuum control panel Used for saturating samples Includes adjustable vacuum valve and vacuum gauge. Two manifolds of 3 and 6 lines. Supply and Installation in fully functional condition along with full accessories.</p>
24	Consolidation test Apparatus (Oedometer)	01	<p>Standards: BS 1377, ASTM D2435, AASHTO T216.</p> <p>Front loading oedometer (03 in No.) with rigid aluminium alloy frame. The lever arm assembly supported with precision self-aligning bearings. Max loading 1800 kg, Using 9:1, 10:1 and 11:1 lever arm ratios. Overall dimensions: 500 x 200 x 750 mm. Fixed ring cell for 50.47mm diameter sample with upper and lower stones, cutter ring and cylinder wall. The cell is supplied with additional outlet suitable for permeability test. Set of slotted steel weights total value 64kg: 2x0.25; 1x0.5; 1x1; 1x2;1x4;7x8kg.</p> <p>Oedometer bench (01 in No.) to accept up to three oedometers. Complete with locking nuts.</p>
25	Triaxial Test Machine	01	<p>Standards: ASTM D2850, ASTM D4767, BS1377:8, NFP94074</p> <p>Triaxial Load Frame 50kN cap. 230-110V/50-60Hz/1ph. RS 232 Controls interface for PC remote control, Microprocessor controlled, Advanced stepper motor drive. Infinitely variable speed from 0.00001 to 9.99 - 12 mm/min.. Audible over travel alarm. Water proof membrane keyboard. Rapid approach facility. Top quality design to eliminate all vibrations. Stainless steel platen.</p>
26	Accessories with Triaxial Test Machine	01	<p>Triaxial cell for 35,38,& 50mm sample sizes.--Maximum working pressure up to 2000 kPa.--Water-repellent grease, 1 kg box.--Pedestal 38mm diameter two pore pressure ports for 100mm triaxial cell.--Top cap 38mm diameter with 2 drainage tubes.--Disc perspex 38mm diameter.--Pair of porous disc 38mm diameter.--Rubber membrane 38mm dia x 150mm long [pack of 10].--O ring 38mm diameter (pack of 10) Membrane Placing tool for 38mm diameter samples.--O Ring Placing Tool for 38mm diameter samples.--Three part split former for 38mm diameter sample.--Two part Split Mould for 38mm diameter sample.--Filter drains [pack of 50] for 38mm samples. Filter discs for 38mm dia sample (pack of 100).--Hand sampler complete of cutter, wooden dolly and receiver for 38mm samples.--Triaxial panel two way, air regulators, pressure gauge outlets for two pressures.--Digital pressure gauge, range 0-1100kPa x 1kPa division.--Oil and water constant pressure apparatus for pressure up to 1700 kPa.--Bladder air/water interface with 1000kPa banded chamber. --Spare membrane for 28-WF4320 bladder.--Laboratory air compressor. 8 BAR max constant pressure. 230V/50Hz/1Ph.--Nylon tubing 4 x 6 mm</p>

			dia 20 m coil. --Nylon tubing 6mm bore x 8mm outside diameter,10metre length.-- Portable vacuum pump, free air displacement 75 l/min, ultimate vacuum 0.1 mbar. 230V/50-60Hz/1Ph. ---Rubber tube dia 6,5 x 12,5mm, 2m long for vacuum pump.-- Paraffin wax 1000g.--De airing water tank, 23l capacity. Easy internal cleaning system.-- Valve panel for use with de-airing tank.--Air drying unit. For use with Silica gel with indicator, 86-D0819.--Silica gel with indicator 1000 g.--Load ring 5 kN cap.--Double burette volume change apparatus.--Red dye hydrocarbon soluble pack for 500ml.-- Pressure transducer 0-10 bar, not compatible with DATALOG series T0601 and T0601/A.--De airing block suitable for banded triaxial cells.-- 03 Channel digital readout system for pore pressure. Measuring units mbar, bar, MPaPa& psi.
27	Sand Density Cone Apparatus	10	Cone 165 mm diameter made of chromium-plated, accurately machined, steel and with a calibrated valve (12.70 mm dia. hole). Aluminum casting base and 5 liter plastic container provided. Dimensions: 460 x 470 x 610 (h) mm. Weight: 4 kg. Supply and Installation in fully functional condition along with full accessories
28	Core Cutter Apparatus	10	Sampling Tube Diameter, 100 x 130 mm (1 kg) Driving Dolly, (1 kg) Driving Hammer, (13.5 kg).Supply and Installation in fully functional condition along with full accessories
29	Unconfined Compression Test Apparatus (Automatic with data Acquisition)	01	Testing Machine, 50 kN A crossbeam and two columns hold the measurement group in position whilst the platen is raised at a constant rate by means of an electric motor. Maximum span between columns 290 mm. Vertical span: maximum 600 mm, minimum 200 mm. Vertical clearance may be adjusted by means of the threaded columns and locknuts. Rapid platen adjustment. Safety devices limit cylinder stroke while controlling stability measuring instrument. Complete with a magnetothermal switch and a lever for upstroke/down-stroke of the test platen. Power supply: 220 V, 50 Hz, single phase, 600 W. 5 kN Proving Ring Complete with Calibration Certificate. Dial Gauge Precision - 30mm Travel, 0.01 Divisions Bracket for Dial Gauge Dial Gauge Datum Bar for Unconfined Test Compression Platen for Unconfined Test - 100 mm Diameter. Displacement measurement: Linear transducer 30 mm travel , Data acquisition unit with software. Software package for data acquisition and creation of relevant test data file a Computer Interface Unit (Comp System(i7) attached) Supply and Installation in fully functional condition along with full accessories.
30	Hand Operated sample Extruder	01	Hand-operated with hydraulic jack (480 mm travel, 6000 kg capacity). Suitable for the extrusion of 35 mm to 152.4 mm diameter samples (thus enabling the extrusion of Marshall, Proctor and C.B.R. samples). Supplied without accessories. Dimensions: 350 x 320 x 1150 (h) mm and Weight: 50 kg.Standard U 4 Sample Tube, Inner Diameter 106 mm x 457.2 mm, Complete with End CapsSteel Sample Tube, Inner Diameter 38 mm x 230 mm, Complete with End Caps Accessories for Extruding Samples of 38, 100, 150 mm Diameter and 4" and 6" Samples Accessories for Extruding 38 mm Diameter Samples Adaptor for Extruding Sample From Tube. Supply and Installation in fully functional condition along with full accessories.
31	Hand Augur	01 Each	1 soil auger 100 mm diameter, 1 soil auger 150 mm diameter, 1 Dutch auger 50 mm diameter, 1 auger for gravel 150 mm diameter, 10 extension rods each 1 m long, 2 Stillson wrenches, 1 steel handle, 1 chisel, 10 sample tubes 38 mm diameter x 230 mm long, 2 adaptors, 1 jarring link. Supply and Installation in fully functional condition along with full accessories
32	Speedy Moisture meter	02	Supplied in a case complete with balance, 4 steel balls to crush sample, tool kit, 3 ampoules for dial gauge checking. Choice of sample weight depends on expected moisture. Capacity: samples weighing from 20 to 100 g. Analogical dial gauge (1.6% accuracy). Moisture range: 0 - 1.6 bar. Supply and Installation in fully functional condition along with full accessories
33	Benkelman beam apparatus	01	Benkelman beam apparatus complete accessories and calibration device. Carrying case, spare gauge with bracket, adjustable feet for Benkelman beam with two spirit level

Local items

Sr.	Items	Qty.	Specifications of items
34	Standard Penetration Test(SPT) apparatus	01	SPT Drop Hammer Assembly, 63.5 kg - Automatic Release With 140 lb (63.5 kg) hammer, anvil and hammer guide rod with automatic release mechanism giving 30" (76 cm) free fall. SPT Sampler Consists of a tube split longitudinally into two parts, the upper end is fitted to the rod coupling, whilst a cutting shoe is fitted to the lower end. The rod coupling contains a ball valve to prevent sample washing during extraction. Dimensions of sampling tube: internal diameter 35 mm, external dia. 50.8mm x 610mm long. Weight: 7.2kg. Tripod, Pulley & Rope supplied locally. Cutting Shoe Cone Rod Made of N 80 Steel - Diameter 50

			mm x 1500 mm Long. Rod Made of N 80 Steel - Diameter 50 mm x 3000 mm Long Nipple for Rod Diameter 50 mm. Lifting Head for Rod Diameter 50 mm. Supply and Installation in fully functional condition along with full accessories.
35	Local item	20	Sample Container (Stainless steel) 2.5 Liter Capacity
36	Local item	20	Sample Container (stainless steel) 0.5 Liter Capacity
37	Local item	20	Sample Tray (Galvanized, 16 Gauge) Size 18" x 18" x3"
38	Local item	20	Round Scoop, (stain less steel, 2kg capacity)
39	Local item	20	Round Scoop, (stain less steel, 5kg capacity)
40	Local item	50	Trowel (stainless steel) size 7 inch. x 5 inch.
41	Local item	20	Trimming Knife (stainless steel)
42	Local item	20	Straight Edge(stainless steel) 300mm
43	Local item	20	Sample Tray (Galvanized, 16 Gauge) Size 12" x 12" x2"
44	Local item	500	Moisture content tin (stainless steel), Cap. 90g approx...
45	Local item	25	Wash Bottle, Plastic 500ml
46	Local item	20	Sample Tray (Galvanized, 16 Gauge) Size 24" x 24" x3"
47	Local item	1	Sampler Splitter of 7mm, (Approx.) opening c/w tray
48	Local item	1	Sampler Splitter of 15mm, (Approx.) opening c/w tray
49	Local item	1	Sampler Splitter of 30mm, (Approx.) opening c/w tray
50	Local item	1	Sampler Splitter of 50mm, (Approx.) opening c/w tray
51	Local item	50	Sieve Brush
52	Local item	5	Electric melting pot , Thermostatically controlled, 220 V, 50 Hz, 1ph
53	Korea	10	Digital Dial Thermometer, range up to 300°C
54	Local item	10	Digital Vernier Caliper 12''
55	Local item	10	Dial gauge 10 mm x 0.002 mm
56	Local item	10	Dial gauge 30 mm x 0.01 mm
57	Local item	30	Hand shovel (rounded point plate, GI , Gauge16)
58	Local Item	8	Wheel barrow (2.5 cft capacity, GI Frame with tube less tyre)
59	Japan	15	Tool kits with complete accessories (screw drivers, pliers, hammer, etc.)
60	Local items	20	GI pot for carrying material (Taghari)
61	Local items	10	Pick mattock
			Total Estimated cost = 22.040M

Note:

1. **All items must be of USA, Japan, Germany, UK, France, Italy, Spain, Belgium, Netherland, Finland, Switzerland & Sweden's manufacturer.**
2. **Quoted hardware must be compatible with lab power supplies and other equipment as per requirement.**
3. **Equipment shall be delivered with all necessary supplies and accessories required for installations and start-up.**
4. **The vendor shall demonstrate and document upon installation that the system meets all performance specifications.**
5. **Comprehensive documentation including Safety/Installation Guidelines and Operation/Experiment Manuals should accompany the product, both in Hard and Soft/CD/eBook formats for all items.**
6. **All items (1-33) of this lab will be technically & financially evaluated as a group. But the bidders are still required to quote individual prices of the items.**
7. **All local items (34-61) of this lab will be technically & financially evaluated as a group. But the bidders are still required to quote individual prices of the items.**

TENDER E: SURVEY LABRATORY

Sr. No	Equipment Name	Qty.	Specifications
1	Five Second Laser digital Theodolite with accessories	05	Laser pointer: Coaxial laser pointer with beam focusing capability, class 2, wave length 633nm, maximum output 0.6mW. Laser range day light 50m. indoor 200m Angle Measurement: method : absolute rotary encoder scanning, display resolutions 1”/5” (0.2 /1mgon), automatic compensation range ±3’ (±55mgon) accuracy: 5” Telescope: length (150 mm), objective aperture 45mm (1.8in.) magnification 30x, resolving power 2.5” , image/field of view : erect 1°30’ (26m/1000m), minimum focus 1.0m., Stadia: multiplication constant :100, additive constant:0, reticle illumination: General: on both faces, display: LCD, 7 digits x 2 lines , back sight, interface RS-232C, Optical Plummet Magnification 3x, Field of view 3° , Minimum focus: 0.5m (1.64 ft.) Level Sensitivity Plate level 40”/2 mm, Tribatch: detachable, Dust and water protection IP66 Power Supply LR6/AA batteries x 4attery continuous operating time 140 hrs. Approximately (theodolite only).Complete with standard accessories. Tripod: Made of aluminum
2	Nine Second Laser digital Theodolite with accessories	05	Laser pointer: Coaxial laser pointer with beam focusing capability, class 2, wave length 633nm, maximum output 0.6mW. Laser range day light 50m. indoor Angle Measurement: method : absolute rotary encoder scanning, display resolutions 10”/20” (2 /5mgon), circle diameter 71mm (2.8in.) accuracy: 9” Telescope: length (150 mm), objective aperture 40mm (1.6in.) magnification 26x, resolving power 3” , image/field of view : erect 1°30’ (26m/1000m), minimum focus 1.0m ., Stadia: multiplication constant :100, additive constant:0 rectile illumination General: on single faces, display: LCD, 7 digits x 2 lines , back sight, Optical Plummet Magnification 3x, Field of view 3° , Minimum focus: 0.5m (1.64 ft.) Level Sensitivity Plate level 60”/2 mm, Tribatch: Fixed, Dust and water protection IP66, Power Supply LR6/AA batteries x 4attery continuous operating time 170 hrs. Approximately (theodolite only).Complete with standard accessories. Tripod: Made of aluminum
3	Automatic Level	05	Telescope: Tube length: 259mm; image: erect; effective aperture of objective: 45mm; magnification: 34x resolution power: 2.5”; field of view: 1°20’; minimum focusing distance: 1.0m; Stadia. Ratio: 1:1000; Stadia. additive constant: 0, Level vial sensitivity: Circular level:10’/2 mm, Standard deviation in 1-km double-run leveling without micrometer:±0.8mm with micrometer±0.4mm, Automatic compensator Type: Wing-hung, air damper; Compensation range:±12’; Setting accuracy: ±0.3” Environmental Stresses : Drop resistance: ISO 9022-33-5;Water-tightness and dust-tightness: IP 57 (Submersible) Power supply: Battery and adapter/charger, Tripod: Made of aluminum; Leveling Staff: 5.0m (made of Fiber Glass with protective cover)
4	Precise Staff 3M Length (SI Units)	10	Precise staff (Deodar wood frame) 3m length, single piece, Graduated in S.I units, Central metal strip made up of an alloy of steel with minimal co-efficient of thermal expansion, two handles at the back and base plate arrangement, Least count = 0.0025m Parallel plate micrometer to be used with precise staff graduated from 0 to 10 with 0.1mm/Div.
5	Robotic Total station accessories	01 Each	Robotic prism, robotic prism pole,GCX3 GNSS Receiver, field control software, field control hardware, office software
6	Local items	10	Trough compass Narrow and magnetized bar of steel pointed at both ends, Length of needle= 30 cm, Mount in a narrow rectangular box carrying a pivot at its center.
		10	Spring balance (0 to 20kg, Stain less steel material, least count=0.5kg)
		10	Trestle (wooden) Made of seasoned shesham wood, top circular 10”, Length of Legs (4 feet)
		5	Survey umbrella (diameter: 2m) pole thickness 25mm

		10	Ranging rods (GI Pipe, painted, 6ft.)
			Total Estimated Cost = 12 Million PKR

Note:

1. **All items must be of USA, Japan, Germany, UK, France, Italy, Spain, Belgium, Netherland, Finland, Switzerland & Sweden's manufacturer.**
2. **Quoted hardware must be compatible with lab power supplies and other equipment as per requirement.**
3. **Equipment shall be delivered with all necessary supplies and accessories required for installations and start-up.**
4. **The vendor shall demonstrate and document upon installation that the system meets all performance specifications.**
5. **Comprehensive documentation including Safety/Installation Guidelines and Operation/Experiment Manuals should accompany the product, both in Hard and Soft/CD/eBook formats for all items.**
6. **All items (1-6) of this lab will be technically & financially evaluated as an individual/separate item.**

General Terms and Conditions

1. Only the sole & certified Dealers/Distributors of the Manufacturers (from the countries of manufacturing as mentioned separately in each tender document) are eligible. Eligible Bidder/Tenderer is a Bidder/Tenderer who has authorization of the Principal/Manufacturer/Dealer necessarily accompanied with PEC registered list of Engineer having training conducted from the Manufacturer. Failure to provide such certificate in the Technical Proposal will make a Bidder/Tenderer liable to be rejected.
2. The Bidders shall compulsorily produce a certificate from the Manufacturer/Principal that it will continue to support the terms and conditions accepted by the Bidder and will comply with these terms and conditions in any circumstances. Failure to produce such certificate from the Manufacturer/Principal will make the Bidder liable to be rejected.
3. The Bidder shall have at least five (05) years of work experience regarding the relevant field in Pakistan for successful delivery and commissioning of such equipment duly supported by the relevant documents in this regard.
4. For Tender A, B, C & tender-D, prices should be quoted on **C&F basis**. While for tender-E prices should be quoted on **FOR basis**.
5. Safe delivery and successful commissioning of the equipment at the University College of Engineering & Technology, The Islamia University of Bahawalpur shall be the responsibility of the contractor. If the items supplied are not according to the required specification/make it will have to be replaced by the firms on their own cost.
6. Payment will be made through **irrevocable letter of credit**, which will be opened by the Islamia University of Bahawalpur, with the terms that 80% payment against the shipping documents at sight after completion of codal formalities and rest of 20 % payment will be released after successful commission and testing of the equipment at IUB site. The successful bidder will be responsible for all kinds of charges (customs clearance, freight, insurance, loading, unloading etc.) and any other expenditure regarding extension or amendment of L/C etc. till the successful delivery of items at IUB site.
7. Agreement on stamp paper @ 0.25 percent of total cost should be submitted by the firm.
8. If the acceptance letter of a tender issued during the validity period of the tender is not accepted by the Bidder or the Bidder remains unable to comply with the supply order, the bid security shall be forfeited. Furthermore the bid security shall be forfeited in the following cases.
 - a) In case the offer is withdrawn, amended or revised during the validity period of the tender.
 - b) In case the Bidder fails to execute the order strictly in accordance with the terms and conditions laid down in the order.
9. The successful Tenderer/the Contractor against each Item(s) shall furnish a Performance Security as under:
 - a) Within **twenty (20) days** of the receipt of the Acceptance Letter from the Purchaser, in the form of Bank Guarantee from the Principal / Demand Draft / Pay Order / Call Deposit Receipt, in the name of the Treasurer, The Islamia University of Bahawalpur, issued by a Scheduled Bank operating in Pakistan, for a sum equivalent to **10%** of the contract value denominated in Pak Rupees.
 - b) The Performance Security shall be confiscated, on occurrence of any / all of the following conditions and it will be retained for the initial period of warranty (03 Years):-
 - i. If the Contractor commits a default under the Contract;
 - ii. If the Contractor fails to fulfill the obligations under the Contract;
 - iii. If the Contractor violates any of the terms and conditions of the Contract.
 - iv. If the Contractor remains unable to comply with the terms and conditions of the contract as

mentioned in the Tender Document.

- 10.** Technical Proposal shall compulsorily comprise the following, **without quoting the price:**
- a) Technical Proposal Form.
 - b) 02% Bid Security of the estimated cost as mentioned in the Tender.
 - c) Covering letter duly signed and stamped by authorized representative.
 - d) Authorized Certificate / document from the Principal / Manufacturer necessarily accompanied with PEC registered list of Engineers, having training conducted from the Principal/Manufacturer. Failure to provide such certificate will make the Bidder liable to be rejected.**
 - e) **The Bidders shall compulsorily produce a certificate from the Manufacturer/Principal that it will continue to support the terms and conditions accepted by the Bidder and will comply with these terms and conditions in any circumstances. Failure to produce such certificate from the Manufacturer/Principal will make the Bidder liable to be rejected.**
 - f) The Bidder shall attach the relevant evidence of having at least five (05) years of work experience regarding the relevant field in Pakistan for successful delivery and commissioning of such equipment duly supported by the relevant documents in this regard.
 - g) Technical Brochures /Literature
 - h) Technical proposal shall be submitted in ring binding to ensure the safety and security of all the documents submitted by the Bidder.
 - i) The Tenderer shall also enclose soft copies of the Technical Proposal, including all Forms, Annexes, Schedules, Charts, Drawings, Documents, Brochures, Literature, etc., in the form of MS Word Documents, MS Excel Worksheets and Scanned images, with the hardcopies.
- 11.** Where a reference is made to any specifications or national or international standard, equal or higher quality will be acceptable. In case your offer conforms to the standards other than quoted in the tender document, you are required to submit the required evidence of equivalence by the recognized forum and a copy of each of the standard.
- 12.** Delivery period shall be 90 days from the date of opening of L/C against the order.
- 13.** The Contractor shall furnish the user documentation, the operation manuals, and training manuals for each appropriate unit of the supplied items and other information pertaining to the performance of the items, in hard copy format and in soft copy format.
- 14.** The bidder shall ensure the warranty, after sale service and supply of the spare parts must be guaranteed. All the supplies must be covered comprehensively for after sale & service both labor and parts for the period of warranty of 03 years after the issuance of Taking-over Certificate in respect of items or any portion thereof as the case may be.
- 15.** Any clarification may be sought from the contractors and the Bidders may be asked to give the presentation of their product.
- 16.** Warranty Requirements are as under;
- a) The Contractor shall warrant to the Purchaser that the equipment supplied by the Contractor, under the Contract are genuine, brand new, non- refurbished, un-altered in any way. The component(s) of any item(s) found dead on arrival /defective shall be replaced with new item(s) or component(s) by the contractor as such and shall in no way be referred to the warranty.
 - b) The Contractor shall provide Manufacturer's warranty of parts and workmanship for minimum period of three (03) years after the issuance of Taking-over Certificate in respect of the items or any portion thereof, as the case may be, which will include: Free on site repair / replacement of defective / damaged parts, labor and transportation expense of any kind, within four weeks of intimation.
 - c) The Contractor shall clearly mention the Terms and Conditions of service agreements for the items supplied after the expiry of initial warranty period of three 03 years.

17. The taking-over certificates will be issued after the supply of the items (including installation, configuration, deployment, commissioning, testing, and training of the delivered items).
18. Validity of rate should be for 120 days from the date of opening of tenders.
19. The vendors will be responsible for any damages during Transit/Delivery. They will also be responsible for any accident and their consequent damages.
20. The successful Bidder/Tenderer in the financial stage has to submit an authorization of the Principal/Manufacturer/Dealer duly verified by the embassies concerned. In case the bidder fails to provide such certificate, IUB will not issue the supply order to the bidder.
21. The Contractor shall arrange and undertake a comprehensive training program for the staff nominated by the Principal UCET, to ensure that they shall acquire a good working knowledge of the operation, and general maintenance of the equipment to be supplied under the Contract.
22. The pre-shipment inspection visit of at least two personnel nominated by the Principal Engineering college, Islamia University Bahawalpur and / or the inspection of the Equipment Principals/Proprietor at the premises, if desired by The Islamia University of Bahawalpur shall be arranged by the Supplier / Contractor at his / her own cost. The responsibility for the quality, quantity, correctness and adherence to the Specifications etc. of the Equipment shall lie solely and squarely on the Supplier / Contractor.

Signature: _____

Name: _____

Designation: _____

Date: _____

ATTACHMENTS:

- Bid Money with the Technical Proposal (02% of the Estimated Cost). (Yes /No)
- Affidavit for Non-Black listing (Yes /No)
- Bid Validity Certificate. (Yes /No)
- Duly Signed terms & conditions (Yes /No)
- All the other documents mentioned in the Tender Document. (Yes /No)
- All the other documents mentioned in the General Terms & Conditions. (Yes /No)

NOTE: Bid shall be signed by the bidder/authorized person for bidder.