SINDH AGRICULTURE UNIVERSITY TANDOJAM

No. PD-SAU-2024/ **224**
Dated: 04/03/2024

Corrigendum

This is to modify in the NIT No. PD-SAU-2024/217, dated: 22/02/2024, as under:

1. The venders supplying the imported equipment must have to show the evidence of authorized dealer ship certificate from the manufacturer.
2. The firms are bound to submit affidavit for supplying the parts of related equipment for ten years and free service and parts during warranty period i.e. one year.
3. The vender must have a team of certified engineers from PEC certification and submit along with bid.
4. The land line contact number shown in the NIT may be replaced with 0300-3071598 for any contact and quarry.
5. The specification of following items has been modified as under:

BoQ S. No.	Name of equipment	Qty	Rate	Amount
12	Transmission Model Gear Section cut away transmission model for learning purpose. Both automatic and Manual transmission Country of Origin: UK/USA/EU or Equivalent	1		
58	Small engine test bed Main metallic elements made of stainless steel. Diagram in the front panel with distribution of the elements similar to the real one. Mounting base with vibration dampening device to install the testing engine. Transparent panels that allow to visualize the operation of the unit. Computer controlled electric motor to generate the load: Braking torque: 8 Nm. Maximum speed: 3600 rpm. This motor also works as the engine starter. Transmission between the combustion engine and the brake through an elastic coupling. Acceleration of the combustion engine through the computer controlled fuel valve (acceleration/deceleration). l capacity fuel tank: either for petrol or for diesel-oil (depending on the purchased test engine). Determination of the characteristic curves of an internal combustion engine at different speed regimes: Torque. Power. Specific consumption of fuel. 2 Determination of the efficiency, fuel specific consumption and air-fuel ratio of an internal combustion engine. 3 Determination of the volumetric efficiency and the average effective pressure of an internal combustion engine. Additional practical possibilities: Country of Origin: UK/USA/EU or Equivalent	1		
75	Soil Augers/ Sampling Kit Basic sampling kits provide auger to a target depth as deep as 12ft and obtain a relatively undisturbed soil core sample for soil testing for site investigations. They are available with 5/8" threaded components with either 2-1/4" or 3-1/4" augers. Each kit comes with (1) regular, (1) mud, and (1) sand auger. The kits also include (3) 4' extensions, (1) 18" rubber-coated	2		

	cross handle, (1) regular slide hammer, (1) core sampler (1-1/2" x 6" or 2" x 6"), (1) plastic liner, (2) plastic end caps, (1) cleaning brush, (1) universal slip wrench, and (2) cresent wrenches. All the components fit securely in a foam-lined, poly-reinforced deluxe carrying case with handles and wheels for added portability. Country of Origin: UK/USA/EU or Equivalent			
76	Falling Head Permeameter Equipment Used to determine the permeability of fine-grained soils such as clay-like or silty soils. The specimen is confined within the permeameter which is connected to the manometer tube filled with water. Country of Origin: UK/USA/EU or Equivalent	2		
79	Soil Hydrometer Soil Hydrometers are used to test the particle size distribution of fine-grained soils in the hydrometer analysis of soils test. Country of Origin: UK/USA/EU or Equivalent	1		
84	COMPUTER CONTROLLED WATER HAMMER UNIT Anodized aluminum frame and panels made of painted steel. Main metallic elements made of stainless steel. Diagram in the front panel with distribution of the elements similar to the real one. Constant level tank, manufactured in PVC glass, which supplies water to the circuits for making the practices. Discharge tank, manufactured in PVC glass. Four circuits/pipes for essays: Stainless steel (D=25 mm). PVC (D=25 mm). PVC (D=32 mm)PVC (D=25 mm) and methacrylate (D=40 mm), interchangeable with the third one when checking the effects of abrupt expansions in pipes. Ball valves, to open or close the relevant circuit. Three impact valves provide fast closing necessary to circuits/pipes for essays: Stainless steel (D=25 mm). PVC (D=25 mm). PVC (D=32 mm). PVC (D=25 mm) and methacrylate (D=40 mm), interchangeable with the third one when checking the effects of abrupt expansions in pipes. Ball valves, to open or close the relevant circuit. Three impact valves provide fast closing necessary to produce the characteristic overpressure of the hydraulic ram and warrant a fast closing without vibrations that affect to measurements. Two pressure sensors, which can be placed in any of the twelve possible points of the four circuits, range: 0 – 5 psi. Three surge tanks (equilibrium chimneys) adaptable to any of the several possible points of the system and subjection clips. Included elements: - FME00/B. Basic Hydraulic Feed System: Centrifugal pump:0.37 kW. 30 – 80 l/min at 20.1 – 12.8 m. tank capacity: 140 l approx. Flow meter. Membrane type flow adjusting valve. Safety switch. Country of Origin: UK/USA/EU or Equivalent	1		
96	Double Ring Infiltrometer simple instrument that is used to determine the rate of infiltration of water into the soil. Country of Origin: UK/USA/EU or Equivalent	1		
127	COMPUTER CONTROLLED AIR CONDITIONING LABORATORY UNIT Anodized aluminum frame and panels made of painted steel. The unit includes wheels to facilitate its mobility. Main metallic elements made of stainless steel. Diagram in the front panel with distribution of the elements similar to the real one. Tunnel: Material: stainless steel. Dimensions: 300 x 300 x 1600 mm. It includes: Axial fan, with speed control from computer, max. speed: 2500 rpm, max flow: 2160 m^3/h. Two heating elements, computer controlled: one. (pre-heater) situated at the evaporator inlet, power: 2000 W and other (re-heater) situated at the vaporator outlet, power: 1000 W. PID	1		

	control of e the temperature. Four hygrometers, placed along the tunnel, formed each one by two temperature sensors (wet and dry bulb). Two steam lines inject steam from a steam generator (not included) to the tunnel to modify the air characteristics. Two windows of 200 x 300 mm to visualize the tunnel inside. Evaporator. It consists of a finned radiator where a coolant flow circulates. Cooling circuit. It includes: Compressor, computer controlled, 1/2 CV. Filter. Condenser. High-pressure switch (it switches off the compressor when the pressure reaches the fix pressure). Expansion valve. Twelve temperature sensors, type "J": Eight temperature sensors (four temperature sensors (dry bulb) and four temperature sensors (wet bulb) to form four hygrometers). Four temperature sensors in the cooling circuit: Two temperature sensors at the inlet and outlet of the evaporator and two temperature sensors at the inlet and outlet of the condenser. Two flow sensors: Flow sensor to measure the coolant flow, range: 5 – 60 l/h. Flow sensor to measure the air flow, range: 0 – 2500 m^3/h. Two pressure sensors: Pressure sensor is situated at the condenser inlet and other is situated at the condenser outlet, range: 0 – 25 bars. Three Bourdon manometers: Manometer is situated at the evaporator inlet, other is situated at the evaporator outlet and the last one is situated at the condenser outlet. Psychrometric chart and Enthalpy diagram of R-513a. This unit has been designed for the use with the refrigerant R-513a, CFC-free, environmentally friendly.			
128	COMPUTER CONTROLLED VAPOUR-COMPRESSION REFRIGERATION UNIT Anodized aluminum frame and panels made of painted steel. The unit includes wheels to facilitate its mobility. Main metallic elements made of stainless steel. Diagram in the front panel with distribution of the elements similar to the real one. High pressure area: Computer controlled hermetic compressor with different operation speed. Wattmeter to measure the compressor power. Pressure sensor located at the outlet of the compressor, range: 0 – 25 bar. High pressure manometer located at the outlet of the compressor. "J" type temperature sensor located at the outlet of the compressor. High pressure switch. Condensation area: Plate heat exchanger that uses water as heat transfer medium. High pressure manometer located at the outlet of the condenser. "J" type temperature sensor located at the outlet of the condenser. Refrigerant receiver. Refrigerant filter to retain particles of condensate. Refrigerant flow sensor, range: 5 – 60 l/h. Low pressure area: Expansion valve. Low pressure manometer located after the expansion valve. "J" type temperature sensor located after the expansion valves. Evaporation area and compressor inlet: Plate heat exchanger that uses water as heat transfer medium. Liquid separator to retain liquid particles before going on to the compressor. Low pressure manometer located at the outlet of the evaporator. Pressure sensor located at the compressor inlet, range: 0 – 10 bar. "J" type temperature sensor located at the outlet of the evaporator. Heat exchange water circuit:	1		

	Water reservoir, capacity: 400 l. Two computer controlled water circulation pumps: Max. flow: 47 l/min. Max. head: 6 m. Two regulation valves to control the condensation water flow and the evaporation water flow. Two water flow sensors, one for the condensation water and other for the evaporation water, range: 0.25 – 6.5 l/min. Four "J" type temperature sensors for measuring the inlet and outlet temperature of condensation and evaporation water. Enthalpy diagram of R-513a. This unit has been designed for the use with the refrigerant R-513a, CFC-free, environmentally friendly			
129	COMPUTER CONTROLLED REFRIGERATION CYCLE DEMONSTRATION UNIT Bench-top unit. Anodized aluminum structure and panels of painted steel. Main metallic elements of stainless steel. Diagram in the front panel with distribution of the elements similar to the real one. Compressor: Computer controlled hermetic compressor. Power: 1/2 CV. Condenser: Vertical transparent cylinder, through which the coil of heat exchange can be seen. Totally hermetic by Viton joints. It has a copper coil through which circulates cooling water inside: Nine nickel-plated copper spires. Diameter of coil: 1/4". Heat transfer area: 0.032 m^2 approx. Expansion: Expansion valve, float type, that is assembled on the condenser. Sight glass placed between the expansion valve and the evaporator, to show the formation of vapour bubbles after the expansion valve. Evaporator: Vertical transparent cylinder, through which the coil of heat exchange can be seen. Totally hermetic by viton joints. It has a copper coil through which circulates water to promote the ebullition inside: Nine nickel-plated copper spires. Diameter of coil: 1/4". Heat transfer area: 0.032 m^2 approx. Instrumentation: Eleven temperature sensors ("J" type) that indicate the water output and input temperatures, both in the condenser and in the evaporator, and the evaporation, condensation, expansion and environmental temperatures. Two flow sensors to measure the water flow (condenser and evaporator), range: 0.25 – 6.5 l/min. Two pressure sensors indicate the refrigerant fluid pressure in the condenser and in the evaporator: Pressure sensor (condenser), range: 0 – 6 bar. Pressure sensor (evaporator), range: -1 – 1.6 bar. Power measurement from computer. Measure range: 0 – 1000 W. The unit has all necessary security measures for safe work: Relief valve with a tare of 2.4 bar, so in case of overpressure in the condenser it will open. High pressure cut-out, that stops the compressor if the condensation pressure. exceeds 2.3 bar. Other valves: Isolation valves to allow easy maintenance and modification. Control valves. This unit has been designed for the use with the SES36 refrigerant gas, environmentally friendly. With the unit is supply following diagrams: Mollier diagram of SES36 refrigerant. Enthalpy diagram of SES36 refrigerant.			

	The complete unit includes as well: COMPLETE TECHNICAL SPECIFICATIONS (for main items) With this unit there are several options and possibilities: Main items: 1, 2, 3, 4, 5 and 6. Optional items: 7, 8, 9, 10 and 11. Let us describe first the main items (1 to 6): 1 Advanced Real-Time SCADA. Open Control + Multi control + Real-Time Control.			
140	Kjeldahl units The completely automatic Kjeldahl distillation and titration system offer great performance and the maximum in terms of safety for the user. Automatic addition of all the reagents involved with low level warning, simplifies the routine activity whilst the possibility to set the steam output from 10% to 100% enlarges the application range of UDK 169. Automatically the unit will perform distillation and titration. The possibility to set the steam output from 10% to 100% makes the instrument highly recommended for a wide range of applications, including the most specific, which require special parameters. UDK 169 is ideal for reliable determination of ammoniacal nitrogen, protein nitrogen (Kjeldahl), nitric nitrogen (after reduction/devarda), phenols, volatile acids, cyanides and alcohol content. At the end of the analysis, all the residues can be aspirated automatically, both for distillation and titration. Country of Origin: UK/USA/EU or Equivalent	1		

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PROJECT DIRECTOR