Sr. No	Description of equipment with complete Specification Centrifugal Pump Test Rig:	Qty.	Remarks
1.	**Venturimeter, Orificemeter & Rotameter apparatus:** The apparatus should consist of two pipelines emerging out from a common Pipe. One pipeline should contain a Venturimeter, second should contain an Orifice meter. The common pipeline should contain a Rotameter. Differential manometer should be provided along with pressure taps from venturii & orifice meter for measuring the presure differences. The Venturimeter & Orificemeter should be connected in such a way that anyone of them can be put in operation by operating valves provided at the downstream. There should be a self-contained water re-circulating unit, provided with a sump tank and a centrifugal pump. **Techincal Details:** **a) Venturimeter:** Material of Clear Acrylic compatible to 1"Dia. Pipe **b) Orificemeter:** Material of Clear Acrylic compatible to 1" Dia. Pipe. **c) Rotameter: I)** Range 30 LPM **II)** Material of construction of Clear Acrylic **d) Water Circulation: I)**FHP capacity **II)**Make of Crompton Greaves / Kirloskar **e) Flow Measurement: I)**Capacity 40 Ltrs. **II)** Material of construction stainless steel fitted with Piezometer Tube & scale **f) Sump Tank: I)**Capacity of 80 Litres **II)** Material of construction stainless steel **g) Piping:** Material of construction GI and PVC **h) Stop Watch:** Electronic **i) Control Panel:** On/Off Switch, Mains Indicator, etc.	01 no.	
2.	**Fluidized Bed Characteristics:** The setup should consist of a glass column with fluidizing material i.e. beads or Sand. Stainless steel mesh should be provided to support the fluidization material. There should be provision to measure the pressure drop across fluidized bed. The setup should be designed to study the fluidization characteristics and relationship between the velocity of the fluid and pressure drop per unit length. **Technical Details:** **a) Column:** Should consist of material borosilicate glass with OD 55mm, Length 750 mm (Approx) **b) Packing:** Beads or Sand **c) Pressure Drop Measurement:** Using Manometer **d) Fluid Circulation & Measurement:** FHP Pump With 30 litres Supply Tank & Rotameters **e) Piping:** GI / PVC **f) Control Panel:** With necessary instrumentation	01 no.	

3.	**Centrifugal Pump Test Rig:** The equipment should be used to study the performance of centrifugal pump. This equipment must consist of a centrifugal pump coupled with electrical motor, supply tank, measuring tank & pipe fittings for closed loop water circulation. Pressure and vacuum gauges should be connected on delivery and suction side of pump for the purpose of measurement. **Technical Details:** **a) Pump:** **I)** Capacity 1 HP **II)** Speed 2800 RPM (max) **III)** Head 12m(max.), **b) Drive: I)**Fixed speed with step cone pulley arrangement **II)** Variable Speed with Variable Speed drive. **c) Supply Tank: I)** Capacity 120 Ltrs **II)** Material of construction Stainless steel **d) Measuring Tank: I)** Capacity 70 Ltrs. **II)** SS fitted with Piezometer Tube & scale **e) Piping:** GI / PVC **f) Stop Watch:** Electronic **g) Control Panel:** With required instrumentation	01 no.	
4.	**Cyclone Separator:** • It Should consist of vertical cylinder with the inlet stream introduced tangentially near the top giving the suspension a spinning rotation in the cylinder. A collector should be fitted at the bottom to collect the solids & the induced draft blower should be used to create the air stream. The classified air should leave the cyclone through a pipe extended down into the cyclone which should passes through blower. • It should consist of a fine screen cloth bag to avoid dust expansion in the laboratory. • Discharging silo should be provided for solid mixing. • Pitot tube with manometer should be provided to measure the flow rate of air. • There should be provision for measuring pressure drop in the cyclone. **Technical Details:** **a) Cyclone:** Size dia 100mm **b) Solid Discharge**: Suitable Capacity with discharge control valve. **c) Blower:** ID Fan Blower with 1 HP Crompton Motor. **d) Air Flow Measurement:** Orifice meter with Manometer. **e) Pr. Drop Measurement:** Manometer. **f) Solids Collector:** Transparent PVC container fixed with Cyclone. **g) Fine Dust Collector:** Bag of Nylone cloth fixed on exit of air. **h) Control Panel:** With required instrumentation	01 no.	

5.	**Temperature Control Trainer:** • Temperature control trainer should be designed for understanding the basic temperature control principles. • The process setup should consist of heating tank fitted with controlled heater for on-line heating of the water. • Rotameter should also be provided along with setup for measuring and manipulating the flow of water. • Temperature sensor should be provided for sensing the temperature. • The process parameter (Temperature) should be controlled by microprocessor based digital controller which manipulates heat input to the process. **Technical Details:** **a) Type of control:** SCADA **b) Control unit:** Digital controller **c) Communication:** USB port **d) Temperature sensor:** RTD Type **e) Heating control:** Proportional power controller (SSR), Input 4-20 mA, Cap. 20 A. **f) Heater:** With capacity 3 KW **g) Rotameter:** 6-60 LPH **h) Process tank:** Stainless steel & Capacity 0.5 lit, insulated. **i) Software:** SCADA package	01 no.	
6.	**Solid-Liquid Extraction (Packed Bed Type):** • This apparatus is required to study the performance characteristics of solvent extraction of a particular component from a packed bed of solid material. • The apparatus should allow study of systems like water /inorganic salts, water/sugar bed, etc. • The equipment should consist of a glass column, feed tank, receiving tanks and piping. • There should be a glass column fitted with SS mesh to support the solid material. • Solvent feed tank should be kept in a bath fitted with heater. A digital temperature controller should be there to control and measure the temperature of feed. **Technical Details:** **a)Extraction Column: I)**Material Glass. **II)** Dia 80 mm **III)**Height 500mm (approx.) **b) Rota meter:** Solvent Flow Measurement **c) Solvent Tank: I)** Made of Stainless Steel **II)** Double walled with Capacity 20 Ltrs. **d)Feed circulation :I)** Magnetic Pump made of Polypropylene to Circulate solvent. **II)**Maximum working temperature is 75^0C (approx). **e) Heater** Nichrome wire heater **f) Receiving Tank:** With Filtration Sieve (for Extracted solid	01 no.	

	waste and solvent) **g) Feed Piping:** Chemical Circulations By PVC/SS **h) Temperature Sensor:** RTD PT-100 type. **i) Control panel:** Required necessary instrumention		
7.	**VAPOUR IN AIR DIFFUSION APPARATUS:** • Apparatus should be able to determine diffusivity of the vapors by WINKELMANN method in which liquid is allowed to evaporate in a graduated vertical glass tube over the top of which a stream of air is passed. • The setup should contain all necessary accessories to determine the diffusion coefficient of vapors (liquid) in air phase. • The vessel should be mounted over a Magnetic Stirrer cum hot plate of Superior quality provided with controls to vary the temperature and RPM to calculate the rate of diffusion at different temperature. • The Air Flow stream should be generated using mini-air pump. **Technical Details:** **a) Diffusion tube:** Material Borosilicate Glass Type 'T' **b) Diffusion vessel: I)** Material Borosil glass/ acrylic **II)** Capacity 1-2 Litres. **c) Hot plate:** Standard make of suitable capacity **d) Stirrer:** Teflon magnet **e) Air Circulation:** Mini Air pump	01 no.	
8.	**NATURAL DRAFT TRAY DRYER:** • The equipment should be designed to demonstrate and stimulate the moisture removal by heat under natural draft action created by hot air stream. • The equipment should consist of an insulated double walled chamber. Inside the chamber a tray should be attached directly to an electronic weighing balance, which must be fitted on top outside the chamber. • Material for drying should be placed in the tray for regular loss of weight to be monitored. • Air should work as the drying agent by natural action which removes the moisture from the tray by passing towards the top openings. • A digital temperature controller should be there to control and measure the temperature of air stream. **Technical Details:** **a) Drying Chamber:** Material Stainless Steel size 30 x 30 x 30 cm insulated by Ceramic wool and housed in a MS Chamber. **b)Tray:** Material Aluminium / Stainless Steel **c) Weighing Balance:** Digital, 0-500 gm range **d) Heater:** Nichrome wire heater **e) Control panel:** Required necessary instrumentation	01 no.	

9.	**Ion Exchange Unit:** • The equipment should consist of two glass column packed with Anion and Cation exchanger resin up to suitable height. • The layer of the glass wool should be placed on top of the resin bed. • The feed should be allowed to enter from the bottom of the first column which comes out of the top, which is again passed through the second column in the same fashion. • A digital conductivity meter should be there to measure the conductivity of liquid coming out of the second column. Flow rate of water should be measured with the pre-calibrated Rotameter. **Technical Details:** **a) Column: I)** Material of construction Borosilicate Glass/ Stainless steel with Dia 35 mm **II)** Length 500 mm (approx.) with stainless steel end cups & support plates **b) Water Feed Tanks:** Material Stainless Steel, 3 sump tank for regeneration test solution & wash solution are provided. With feed lines, drain valve etc. **c) Flow Measurement:** Rotameter (for feed) **d) Feed Circulation:** By FHP chemical resistance Pump using PVC pipe line & fittings **f) Feed Piping:** Chemical Circulations By PVC/SS size 1/4'' **g) Stop Watch:** Electronic type **h) Control panel:** Required necessary instrumentation	01 no.	

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Sub: Notice inviting quotation for purchase of equipment.

This Institute intends to purchase different equipment as per specifications notified in **"Annexure – A"**. Please send your quotation to the undersigned in a sealed cover duly super scribed on envelop "Quotation for supply of equipment for CHE dept." so as to reach latest by closing date/time i.e. 27.02.15 up to 4.00 P.M.

The Terms & Conditions are as under:-

1) It may be noted that quotation will be sent through registered/speed post only. The institute is located in a remote area and it takes 5 to 7 days to reach the mail, therefore, quotation be dispatched well in time to avoid any sort of delay.
2) Rate of ST/VAT if extra must be mentioned clearly.
3) The other terms & conditions for submitting the quotation are given overleaf which must be read carefully before submitting the quotation.
4) Quotation other than those addressed will not be entertained.
5) The Prices quoted must be FOR SLIET, Longowal.
6) Quotation must be sent on the letter head of the party.
7) As per instructions if purpose of quotation is not super scribed and quotation is opened by mistake then it may be rejected.

F. I/c (Purchase)

TERMS & CONDITIONS FOR QUOTATION

DELIVERY	The rate quoted must preferably be free delivery/F.O.R. Longowal after allowing the discount, if any. Where quoted extra ad-valorem rate payable, it should be clearly indicated. Supply should be made within the specified delivery period.
TERMS OF PAYMENT	Our normal terms of payment is within 30 days after receipt of stores in good condition by means of cheque/draft/RTGS
TAXES	No sales tax concession against Form C and 'D' is admissible to this Institute. However, '**Form E'** certificate being an educational institute can be issued if sales tax concession is admissible.
EXEMPTIONS	Excise and customs duties are exempted to the institute. The relevant exemption certificate will be issued to the successful bidder only if the excise duty/custom duty is exclusively mentioned in the Quotation. In case the offered items are to be imported, the rates should be quoted in foreign currency on FOB basis. Basic duty as applicable under notification No. 51/96 customs dated 23.07.1996 as applicable shall be borne by the institute. If the price quoted is in foreign currency then payment shall be made through letter of credit against submission of B.G. of Min. 25% value of supply order, if the order value is more than US$ 10,000 or through Telegraphic Transfer (TT) if the order value is less than US$ 10,000 though Nationalized banks. The bank charges outside India should be borne by the Beneficiary. Clearance at customs will be arranged by us but you will assist our clearance agent. In case of indigenous item the price must be quoted in Indian Rupees and 100% payment will be made only after successful installation, testing and commissioning of equipment. **No advance payment will be made.**
DIRECTOR'S RIGHTS	Director, SLIET, reserves the rights of acceptance or rejection of any or all quotations. The discretion for increasing or decreasing of the quantities also rests with him. SLIET also not bind itself to accept does the lowest price. In case of any dispute, the decision of Director SLIET will be final & binding.
VALIDITY OF QUOTATIONS	Quotations will be considered valid for 03 months from the date of quotation
CORRESPONDENCE	No correspondence regarding acceptance/rejection of a quotation will be entertained.
SAMPLE/BRAND/MAKE/ **WEIGHT**	Sample where asked for, will invariably be made available and sent along with the quotations. However, Brand/Make/Weight etc. must be mentioned clearly in the quotations. Technical literature/pamphlet should also be enclosed.

REJECTION	Quotation not confirming to the set procedure as above will be rejected.
DISCOUNT/REBATES	A special discount/rebate wherever admissible keeping in view that the supplies are being made for education purpose in respect of Public Institution of national importance may please be indicated.
	Conditional, telegraphic quotation shall be rejected out rightly.
	SLIET shall not be held responsible for any postal delay in sending or late receipt of quotation.
	Quotation should be free from corrections & erasures. **Faculty I/c (Purchase)**