

Appendix-I

Sr. No.		Qty.
1.	<p><u>Recirculating Flume - 10 m × 1 m × 0.8 m (L×W×H):</u></p> <p>Flume Experimental Section:</p> <p>Test section Length: 10 m</p> <p>Material: Stainless Steel grade 304</p> <p>Thickness: 10 mm</p> <p>Flow Cross-section (W×H): 1 m × 0.8 m</p> <p>Inclination adjustment: – 0.75 to 2.5 %</p> <p>Other Technical details:</p> <ol style="list-style-type: none"> 1. Flume bed shall be of stainless steel (grade 304) with thickness of at least 10 mm. 2. Bottom of the flume bed shall have the provision of at least 40 evenly distributed measuring points along the 10 m length. 3. All Manometer tappings (40 Nos.) should incorporated with Quick Releasing non-spill coupling arrangements to avoid spillage of fluid on laboratory floor. 4. At least 20-tube manometer panel (To read the pressure, the pressure measuring points should be connected to the manometer panel via hoses to allow direct reading of profile of depth over the entire length of the experimental section on the 20-tube manometer panel) 5. Side walls of the experimental section shall be made of scratch proof tempered glass of 15 mm thickness. Toughened Glass should be screwed or bolted with channel frame of stainless steel and bed to make glass easily replaceable in case of breakage. 	1 Unit

	<p>6. Owing to TDS in water and inclusion of sediments, all the material must be corrosion-resistant material .i.e. stainless steel (grade 304).</p> <p>7. The flume shall be carefully designed in such a way that it satisfies the general tolerances for straightness and flatness according to ISO 2768.</p> <p>8. There shall be provision of Flume length extension if such need arises in future.</p> <p>9. Inclination of the flume – In order to adjust the inclinations of the flume for simulation of the slope and maintaining the constant depth of the flow, motorised inclination adjustment shall be provided. The jacks should be of spindle lifting gear type. Limit switch shall also be provided in the screw jacks as an extra safety feature.</p> <p>10. Inlet section of the flume – It shall be designed to reduce the turbulence to minimum of incoming water. Water should enter from below through flow straightener. Damping plate must be provided to calm the incoming water.</p> <p>11. Outlet section of the flume – It shall be provided with weir plate(s) to adjust and maintain the level of the water throughout the experimental section as per the requirement. An arrangement of free discharge without weir shall also be provided.</p> <p>12. Sediment trap – To carry out the experiments on bed-load transport in the flume, the sediment trap shall be provided. It shall be mounted between the experimental section and the outlet section and consists of sediment trap and a bucket for sediment feed. The sediment trap shall be such that it shall prevent the sediments to enter into the pump or the flow meter of the flume.</p> <p>13. Two pumps shall be provided to cater the small as well as large flow rate. Frequency drive shall be provided to control the flow of pumps. An electronically controlled valve shall also be provided at the pipe line.</p>	
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14. Two Pumps

- a. Max. flow rate (for each pump): 220-230 m³/h
- b. Max. head (for each pump): 30 – 35m
- c. Max working pressure (for each pump): Atmost 1000 kPa
- d. Shut-off head (for each pump): 380 – 400 kPa
- e. Discharge x suction connection (for each pump): 80mm x 100mm flanged to DIN 2532 standard
- f. Casing cover: AISI 316 L Stainless Steel (stamped) (EN 1.4404)
- g. Impeller: AISI 316 Stainless Steel (precision cast) (EN 1.4401)
- h. Casing: AISI 316 Stainless Steel (precision cast) (EN 1.4401)
- i. Stub shaft : AISI 316 Stainless Steel (EN 1.4404)
- j. Rotation speed (for each pump):: 2800 – 2900 min⁻¹
- k. Pole : 2

*There shall be provision of replacement of Pumps or addition of the pumps which can carry the sediments along with the water if such requirement is arises in the future.

15. Arrangement of cutoff at pump – In order to avoid overfilling of the experimental section, when the maximum level in the inlet or outlet section is exceeded, a level switch shall be provided. The level switch shall turn off the pump when the water level is exceeded beyond the maximum level in the inlet or outlet section.

16. Switch box – Position of the switch box shall be on the platform, which controls (flow of the pump, electronically operated valve) the speed.

17. Electronically controlled butterfly valve with hand wheel and position indicator should be included to control the flow. The disc of butterfly valve should be of stainless steel.

18. Electromagnetic flow meter shall have measuring range of 20 – 450 m³/h

	<p>19. The flume shall be recirculating one that carries the water from the tanks through powerful pumps to inlet section of the flume and discharge back to the tanks from the outlet section of the flume.</p> <p>20. Water Tanks – In order to utilise the laboratory space efficiently, an arrangement of water tanks shall be such that it can form a gallery to walk and stand on. This will help users to comfortably reach to any part of the experimental section for taking readings or keeping table on it for the desktop pc, which requires during the measurement of velocity. Staircase shall be provided at both ends of the platform. The drain valves shall also be provided at the bottom of water tanks to remove water. Tanks shall be made of stainless steel (grade 304) and shall have 2 mm thickness. There shall be 4 tanks with capacity of each tank shall be between 3500 liters – 4000 liters.</p> <p>Each tank shall be connected to other tank by means of two parallelly connected stainless steel 304 grade pipes of atleast 8 inch diameter with atleast 3 mm thickness and flanges of atleast 10 mm thickness. The stiffeners used for the tanks shall also be of stainless steel.</p> <p>21. Structure</p> <ol style="list-style-type: none"> Two MS rectangular pipes of 300 x 200 x 8mm thickness arranged parallelly and welded with 16 mm thick plate. Flume Structure Stand – Square pipe of 100 × 100, Thickness 5 mm on 16 mm thick MS plate. Side Support – Rectangular pipe of 80 × 40, Thickness 3 mm (for wider area of visualisation and increased strength) <p>22. All Structural sections used for fabrication should be strictly as per YST standard.</p> <p>23. Instrument Carrier – Instrument Carrier with rail shall be supplied with Flume.</p>	
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