



VT-S.H.Exam. Nov.-13- 99

Con. 9953-13.

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GX-12197

Total Marks : 80

- N.B. : (1) Question No.1 is compulsory.  
 (2) Attempt any three questions from remaining five questions.  
 (3) Assume suitable data wherever necessary.

1. Solve any five :-
  - (a) Write a note on Inclined Tube Manometer. 4
  - (b) Describe the use of friction factor chart. 4
  - (c) Define Mach Number, Sonic Supersonic and Subsonic flow. 4
  - (d) Define Drag and Drag coefficient. 4
  - (e) Explain characteristics curves for centrifugal pump. 4
  - (f) What are the advantages and disadvantages of orificemeter. 4
  - (g) Define surface Tension and Capillarity. 4
  
2.
  - (a) Derive the expression for Hydrostatic equilibrium. 5
  - (b) Explain in brief Rheological behaviour of Newtonian and Non-Newtonian fluids. 5
  - (c) A U-tube manometer is used to measure the pressure of water in a pipe line. The right limb of the manometer contains Hg and is open to the atmosphere. Determine the pressure in the water in the main line, if the difference in the level of Hg in the limbs of U tube is 12 cm and the free surface of Hg is in level with the centre of the pipe. If the pressure of the water in the pipe line is reduced to 9810 N/m<sup>2</sup>, calculate the new difference in the level of the Hg. Sketch arrangements in both the cases. 10
  
3.
  - (a) Derive an expression of Bernoulli's equation from Euler's equation. Give also Modified form of Bernoulli's equation. 10
  - (b) Find the discharge of water flowing through a pipe 40 cm diameter placed in an inclined position where a venturimeter is inserted, having throat diameter of 20 cm. The difference of pressure between the main and the throat is measured by a liquid of specific gravity 0.6 in an inverted U-tube manometer which gives a reading of 40 cm. The loss of head between the main and the throat is 0.2 times the kinetic head of the pipe. 10
  
4. (a) Show that for Laminar Flow through pipes :- 10

$$\frac{\bar{V}}{U_{\max}} = \frac{1}{2}$$

Where,  $\bar{V}$  - Average velocity  
 $U_{\max}$  - Maximum velocity.
  
- (b) A pipeline of I.D. 80 mm and length 250 m is attached to a water reservoir at one end and flows freely into the atmosphere at the other end. The loss coefficient  $K_c$  for the inlet is 0.5. Determine the height 'h', that has to be maintained in the reservoir to produce a volumetric flow rate of 0.025 m<sup>3</sup>/sec of water. 10

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Sub:- Fluid Flow

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5. (a) What are the different methods for prevention of Swirling in Agitation ? Explain in brief. 10
- (b) Derive an Bernoulli's equation in compressible flow for :-
- (i) Isothermal process 5
  - (ii) Adiabatic process. 5
6. (a) A centrifugal pump delivers water at  $0.68 \text{ m}^3/\text{s}$  against at total head of 15 m is driven at 10 rps. Determine the specific speed of the pump. The same pump is now used to deliver water at 40 m head. Determine the speed at which the pump should be driven at the maximum efficiency. The overall efficiency of the pump is 60%. 10
- (b) List out different types of valves used in industries with their functions. 5
- (c) Explain the working of Reciprocating Pump. 5

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