

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (AE) (Sem.-4th)
FLUID MECHANICS & MACHINERY
Subject Code : AE-206
Paper ID : [A0711]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A**I. Answer briefly :**

- a. If K (bulk modulus of water) = 2.2GPa . What pressure is required to reduce the volume by 0.5% ?
- b. Differentiate between simple manometer and differential manometer with neat sketches.
- c. In what way a fluid contained in a vessel moving with constant acceleration comes under the purview of hydrostatics?
- d. Differentiate between tangential and normal acceleration.
- e. Define free and forced vortex motions.
- f. Why a triangular weir is more suitable than a rectangular weir for measuring the discharge?
- g. Write expressions for Mach number and Froude number. Explain the physical significance of both the numbers.
- h. Differentiate between suction head, delivery head and manometric head of centrifugal pump.
- i. What is difference between hydraulic coupling and torque converter?
- j. What is the difference between tangential and radial flow turbines?

SECTION-B

2. A differential manometer is connected to two pipes whose centres are 3m difference in height. Higher level pipe is carrying liquid of specific gravity of 1.5 at a pressure of 1.8 bar and another pipe is carrying liquid at specific gravity of 0.9 at a pressure of 1 bar. The centre of pipe carrying low pressure liquid is 2m above the higher level of the mercury in the manometer. Find out the difference in mercury level in the manometer in cm.
3. Derive an expression for discharge from a vertical venturimeter.
4. Draw a neat sketch of hydraulic intensifier and explain its working.
5. The discharge over a spillway provided on the dam depends upon v , (velocity of flow), L (depth of the throat), H (water head on spillway) and g (acceleration due to gravity). Using Buckingham's π -theorem, show

that
$$\frac{Q}{vL^2} = f \left[\frac{\sqrt{gL}}{v}, \frac{H}{L} \right]$$

6. Derive an expression for Momentum correction factor.

SECTION-C

7. Two tanks 2.5 km long are connected by a pipe of 30 cm diameter. The water level difference between two tanks is 10 m. Find the diameter of another pipe which would provide twice the discharge of the first. Consider f is same in both the cases and consider only frictional losses in both cases.
8. A closed cylindrical vessel 1 m diameter and 2 m high is completely filled with oil whose specific gravity is 0.85. It is rotated at 120 rpm. Find the total pressure at the top, at the bottom and side of the vessel.
9. Write short notes on the following :
 - i) Discharge through a mouth piece
 - ii) Rotameter
 - iii) Hydraulic accumulator