Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (Sem.–3)

FLUID MECHANICS

Subject Code : BTME-301-18

M.Code : 76417

Date of Examination: 24-05-2023

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS 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 have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly:

a) Define viscosity and derive its units and dimensions.

b) How do you determine the fluid pressure and its location on a submerged horizontal surface?

c) "*The liquid mass in a container subjected to constant horizontal acceleration is equivalent to a liquid mass at rest*". Discuss

d) What are the various methods of describing fluid flow pattern?

e) What is kinetic energy correction factor and what is its significance?

f) Explain Reynolds model law.

g) What are the different types of similarities that must exist between model and prototype?

h) What are minor head losses in pipes?

i) Explain vortex motion.

j) Differentiate venturimeter and orificemeter.

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SECTION-B

2. Derive an expression for the force on a thin plate of given arbitrary shape immersed in a liquid at an angle θ to the free surface.

3. Describe an experimental method to determine the metacentric height of a boat.

4. The power P to drive a fan is found to depend on the diameter D, density of the gas p, volume flow rate Q, and the speed N. Using the method of dimensional analysis obtain a correlation in terms of dimensionless numbers.

5. Explain with a neat sketch the working of Rotameter.

6. A water pipe is laid on a slope of 1 in 40. The pipe is 50 m long. Water flows upwards at the rate of $0.06 m^3/s$. The inlet diameter at the lower end is 200 mm. The diameter at the outlet is 400 mm. Determine the pressure at the lower end if the pressure at the higher end is $24.525 N/cm^2$.

SECTION-C

7. Derive two dimensional continuity equation in Cartesian coordinates.

8. Show from basics that in sudden contraction, the loss of head equals $(V_2 — V_1)/^2g$. In the case of formation of Vena-contracta, show that the loss equals$[(l/Cc) – 1]^2/2g$. where $C_c = A_c/A_2$. The terms have usual meaning.

9 Explain what is meant by forced vortex? Derive an expression for the radial pressure distribution in forced vortex.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

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