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

Total No. of Questions : 09

B.Tech.(ME) (Sem.–3)

FLUID MECHANICS

Subject Code : BTME301-18

M.Code : 76417

Date of Examination: 01-01-2024

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 of a fluid.

b) Differentiate Ideal and Real fluids with suitable examples.

c) Explain buoyant force and buoyancy.

d) Explain types of fluid flows.

e) Explain local and convective acceleration with respect of fluid flow.

f) Define Barometer with sketch. State one application of barometer.

g) Draw the energy gradient lines for Bernoulli's Equation for real fluid.

h) What do you understand the need of dimensional analysis?

i) Explain and differentiate orifice and mouthpiece.

j) Derive the relation for discharge through a venturimeter.

SECTION-B

2. The space between two square flat parallel plates is filled with oil. Each side of the plate is 720mm. The thickness of the oil film is 15mm. The upper plate moving with 3m/s requires a force of 120N to maintain the speed. Determine dynamic viscosity of the oil.

3. Some liquids rise and other fall in a fine diameter tube when immersed the fluid. Explain the principle behind the rise and fall of liquids.

4. Derive the relation for metacentric height of a floating body.

5. Explain in detail an engineering example working on Bernoulli's equation.

6. What do you understand by dimensionless numbers? Explain any two with their applications.

SECTION-C

7. Using Buckingham's π Theorem, show that the velocity 'V' through a circular orifice is given by following equation :

$$V = \sqrt{2gH}\ f, \left[\frac{D}{H}, \frac{\mu}{\rho VH}\right]$$

where H = Head of the fluid flow,

D = Diameter of the Orifice,

μ= Coefficient of Viscosity;

ρ = Mass density

and g = Accelaration due to gravity

8. Derive continuity equation Cartesian coordinates OR polar coordinate system.

9. **Write short notes on any four :**

   a) Vapour pressure

   b) Hydraulic coefficients

   c) Effect of temperature on viscosity of fluids

   d) Geometric, kinematic and dynamic similarity

   e) Stability of submerged body

   f) Compressibility of fluids .

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.