

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (Sem-4)
FLUID MECHANICS
Subject Code : BTME-403
M.Code : 59131
Date of Examination : 20-06-2023

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 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) What do you understand by surface tension?
- b) Define equivalent pipe.
- c) How will you classify the fluids?
- d) Define the term: buoyancy and flotation.
- e) What is flow net? Why it is necessary?
- f) Explain the term Vorticity and circulation.
- g) **Define the terms :** (i) local acceleration and (ii) convective acceleration.
- h) Define Mach number.
- i) What is Rotameter?
- j) What are Newtonian and non-Newtonian fluids?

SECTION-B

2. A stream function is given by $\psi = 5x - 6y$. Calculate the velocity components and also magnitude and direction of the resultant velocity at any point.
3. State Buckingham's π - theorem. Why this theorem is considered superior over Rayleigh's method for dimensional analysis?
4. Explain the terms: geometric, kinematic and dynamic similarity.
5. Explain the difference between free and forced vortex motions.
6. Find an expression for the action of fluid pressure on a vertical submerged surface.

SECTION-C

7. A rectangular pontoon 10.0 m long, 7 m broad and 2.5 m deep weighs 686.7 KN. It carries on its upper deck an empty boiler of 5.0 m diameter weighing 588.6 KN. The center of gravity of the boiler and the pontoon are at their respective centers along a vertical line. Find the Meta centric height. Weight density of sea water is 10.104 KN/m^3 .
8. A horizontal pipe line 40 m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25 m of its length from the tank, the pipe is 150 mm-diameter and its diameter is suddenly enlarged to 300 mm. The height of water level in the tank is 8 m above the centre of the pipe. Considering all losses of head which occur, determine the rate of flow. Take $f = 0.1$ for both sections of the pipe.
9. **Explain the following :**
 - a) Dimensionless numbers and their significance.
 - b) Explain any five fluid properties.

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.