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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 Examiantion: 22-11-2023

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. Answer briefly :

a) Define Newton's Law of viscosity.

b) Define metacenter and metacentric height.

c) Differentiate between local and convective acceleration.

d) Define hydraulic and energy gradient lines.

e) What do you understand by kinetic energy correction factor?

f) What is physical significance of Mach number?

g) What is critical Reynolds number?

h) Explain notches and weirs.

i) What are the characteristics of manometric fluids?

j) Define hydraulic diameter.

SECTION-B

2. Using principle of conservation of energy, derive Bernoulli's equation. State the various assumptions used.

3. For an incompressible flow represented by $\Psi = x^2 - y^2$, calculate the total acceleration vector.

4. A U-tube mercury manometer is used to measure the pressure of oil flowing through a pipe whose specific gravity is 0.85. The center of the pipe is 15 cm below the level of mercury. The mercury level difference in the manometer is 25 cm, determine the absolute pressure of the oil flowing through the pipe. Atmospheric pressure = 750 mm of Hg.

5. A 0.25 m diameter pipe carries oil of specific gravity 0.8 at the rate of 120 liters per second and the pressure at a points is 19.62 kN/m^2 (gage). If the point A is 3.5 m above the datum line, calculate the total energy at point A in meters of oil.

6. Explain the working of a Pitot's tube with the help of a neat sketch.

SECTION-C

7. An open circular cylinder of 200 mm diameter and 1.2 m long contains water up to a height of 0.8 m. Find the speed at which the cylinder is to be rotated about its vertical axis, so that axial depth of water becomes zero.

8. The resistance R experienced by a partially submerged body depends upon the velocity V, length of the body l, viscosity of the fluid μ, density of the fluid p and gravitational acceleration g. Obtain a dimensionless express for R.

9. Draw two dimensional continuity equations in cartesian coordinates.

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.