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Total No. of Questions: 09

Total No. of Pages: 02

B. Tech.(ME) (Sem. 4)
FLUID MECHANICS
Subject Code: BTME-403
Paper ID: A1213

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.
 - (a) Define term kinematic viscosity and mention their unit.
 - (b) What do you understand by total pressure?
 - (c) Define the term buoyancy.
 - (d) Write two properties of velocity potential.
 - (e) What is flow net?
 - (f) What are the assumptions made in the derivation of Bernoulli's equation?
 - (g) What is Dimensional Homogeneity?
 - (h) Name the major losses in pipes and write equations to calculate major loss.
 - (i) Define Mach number.
 - (j) Classify notches according to shape.

SECTION B

2. Derive an expression for total force and centre of pressure for inclined plane surface submerged in liquid.
3. A uniform body of size 3m long, 2m wide and 1m deep floats in water. What is the weight of the body if depth of immersion is 0.8m? Determine meta-centric height also
4. If for a two dimensional potential flow, the velocity potential is $x(2y - 1)$, determine the velocity at point P(4,5). Also calculate the value of stream function at point P.
5. A pipe of diameter 40cm carries water at a velocity of 25m/s. The pressures at the points A and B are given as 29.43N/cm^2 and 22.563N/cm^2 respectively while datum head at A and B

are 28m and 30m. Find loss of head between A and B.

6. Determine the viscosity of a liquid having kinematic viscosity 6 stokes and specific gravity 1.9.

SECTION C

7. Derive Darcy Equation for the loss of head due to friction in pipes.
8. The efficiency of a fan depends upon density, dynamic viscosity of fluid, angular velocity, diameter of the rotor and the discharge. Using Buckingham pi theorem express efficiency in terms of dimension less parameters.
9. A trapezoidal channel with side slopes of 1 to 1 has to be designed to convey $10\text{m}^3/\text{s}$ at a velocity of 2m/s so that the amount of concrete lining for the bed and sides is the minimum. Calculate the area of lining required for one metre length of canal.