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# C.U.SHAH UNIVERSITY Winter Examination-2019 

Subject Name : Fluid Mechanics -I

Subject Code : 4TE03FLM1

## Branch: B.Tech (Civil)

Semester : 3
Date : 22/11/2019
Time : 02:30 To 05:30
Marks : 70
Instructions:
(1) Use of Programmable calculator \& any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 Attempt the following questions:
a) Define density of fluid.
b) Write the mathematical representation of Newton's Law of viscosity.
c) Enlist the classification of manometer.
d) Write the name of commonly used manometer liquid.
e) Write the practical application of Bernoulli's equation.
f) What is the difference between Cipolletti weir and rectangular weir?
g) The rate of flow through a V notch varies as
(i) H
(ii) $\mathrm{H}^{5 / 2}$
(iii) $\mathrm{H}^{1 / 2}$
(iv) $\mathrm{H}^{3 / 2}$
h) Absolute pressure is obtained by adding and $\qquad$
i) State Hydrostatic law.
j) In a pipe flow, If the Reynolds number is more than 4000, the flow is said to be ----
k) Define streak line.
I) Write continuity equation.
m) Bernoulli's equation is based on which law.
n) Define Bouncy.

## Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions
(a) A simple U- tube manometer containing mercury is connected to a pipe in which an oil of specific gravity 0.89 is flowing. The pressure in the pipe is vacuum. The other end of the manometer is open to the atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 20 cm and height of oil in the left limb from the centre of pipe is 15 cm below.
(b) What is the difference between dynamic viscosity and kinematic viscosity? State their units of measurements
(c) Explain the types of fluid with neat sketch.
(a) A wooden block of width 2 m , depth 1.5 m and length 4 m floats horizontally in
water. Find the volume of water displaced and position of centre of buoyancy.
(a) A wooden block of width 2 m , depth 1.5 m and length 4 m floats horizontally in
water. Find the volume of water displaced and position of centre of buoyancy. Specific gravity of the wooden block is 0.72 .
(b) A plate 0.025 mm distant from a fixed plate, moves at $50 \mathrm{~cm} / \mathrm{s}$ and requires a force of $1.481 \mathrm{~N} / \mathrm{m}^{2}$ to maintain this speed. Determine the fluid viscosity between the plate in the poise.
(c) State the Pascal's law.

## Q-4 Attempt all questions

(a) State Bernoulli's equation and write its assumption.
(b) A 40 cm diameter pipe, conveying water, branches into two pipes of diameters 30 cm and 20 cm respectively. If the average velocity in the 40 cm diameter pipe is $3 \mathrm{~m} / \mathrm{s}$. find the discharge in this pipe. Also determine the velocity in 20 cm pipe if the average velocity in 30 cm diameter pipe is $2 \mathrm{~m} / \mathrm{s}$.
(c) Explain the continuity equation with neat sketch.

## Attempt all questions

(a) Determine the viscosity of a liquid having kinematic viscosity 6 stokes and specific gravity 2.00.
(b) Find out the minimum size of glass tube that can be used to measure water level if the capillary rise in the tube is to be restricted to 5 mm . consider surface tension of water in contact with air as $0.073575 \mathrm{~N} / \mathrm{m}$.
(c) Enumerate the types of forces acting in the fluid flow.

## Q-6 Attempt all questions

(a) Write short notes on losses in pipe. 05
(b) Explain the terms 'Meta- centre' and meta centric height. $\mathbf{0 5}$
(c) Define an orifice and a mouthpiece. What is the difference between the two?
and sharpness?
(b) The head of water over an orifice of diameter 50 mm is 12 m . find the actual discharge and actual velocity of jet at vena-contracta. Take $\mathrm{C}_{\mathrm{d}}=0.6$ and $\mathrm{C}_{\mathrm{v}}=0.98$

## Q-8 Attempt all questions

(a) A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to inlet and throat is 10 cm of mercury. Determine the rate of flow. Take $\mathrm{C}_{\mathrm{d}}=0.98$.
(b) A jet of water, issuing from a sharp-edged vertical orifice under a constant head of 10 cm , at a certain point, has the horizontal and vertical co-ordinates measured from the vena- contracta as 20 cm and 10 cm respectively. Find the value of $\mathrm{C}_{\mathrm{v}}$. Also find the value of $\mathrm{C}_{\mathrm{c}}$ if $\mathrm{C}_{\mathrm{d}}=0.6$

