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## C.U.SHAH UNIVERSITY

 Summer Examination-2018Subject Name : Fluid Mechanics -I

Subject Code : 4TE03FLM1

## Branch: B.Tech (Civil)

Semester : 3
Date : 02/04/2018
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 specific volume of fluid.
b) Write the mathematical representation of Newton's Law of viscosity.
c) Give the height of water at 1 ATM pressure.
d) Property of a fluid by which its own molecules are attracted is called $\qquad$ .
e) When the water level on the $\mathrm{d} / \mathrm{s}$ side of a weir is above the crest of the weir, then the weir is called as
(i) Cipolletti weir
(ii) Submerged weir
(iii) Ogee weir
(iv)Broad crested weir
f) The maximum efficiency for a series of vanes when the jet strikes at the centre of the vane is given as
(i) $0 \%$
(ii) $25 \%$
(iii) $50 \%$
(iv) $75 \%$
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) Write the formula to calculate resultant force acting on the curved plane $=$ $\qquad$ ---------
j) In a pipe flow, If the Reynolds number is less than 2000, the flow is said to be ----
k) $\qquad$ is the imaginary line drawn through the fluid in such a way that the tangent to it at any point gives the direction of velocity of flow at the
point.
I) According to equation of continuity,
a) $\mathrm{V}_{1} / \mathrm{a}_{1}=\mathrm{V}_{2} / \mathrm{a}_{2}$
b) $\mathrm{W}_{1} * \mathrm{a}_{1}=\mathrm{W}_{2} * \mathrm{a}_{2}$
c) $\mathrm{W}_{1} * \mathrm{v}_{1}=\mathrm{w}_{2} * \mathrm{v}_{2}$
d) $V_{1} * a_{1}=V_{2} * a_{2}$
m) The Bernoulli's equation is based on conservation of
a) Mass
b) Linear Momentum
c) Angular Momentum
d) Energy
n) According to Hagen Poiseuille, the head loss in a viscous flow is given by
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## Attempt any four questions from Q-2 to Q-8

## Q-2 Attempt all questions

(a) The pressure outside the droplet of waters of diameter 0.04 mm is $10.32 \mathrm{~N} / \mathrm{cm}^{2}$ (atmospheric pressure). Calculate the pressure within the droplet if surface tension is given as $0.0725 \mathrm{~N} / \mathrm{m}$ of water.
(b) Write a formula to determine discharge using roughness coefficient in an open channel.
(c) Calculate the density, specific weight and weight of one liter of petrol of specific gravity $=0.7$.

Q-3 Attempt all questions
(a) A rectangular channel conveys a discharge of $12 \mathrm{~m}^{3} / \mathrm{s}$ at a bottom width 3 m .

Find the bed slope required to carry above the discharge if depth of flow is 1 m . Take Chezy's C=50.
(b) Explain the types of fluid with neat sketch.
(c) Enlist the minor losses in flow through pipes. $\mathbf{0 2}$

Q-4 Attempt all questions
(a) Explain Pascal's law with neat sketch.
(b) Explain the various types of fluid flow. 05
(c) Derive Bernoulli's equation from Euler's equation of motion. $\mathbf{0 5}$

## Q-5 Attempt all questions

(a) A Cipolletti weir of length 2 m has of head of 1 m . Find the discharge over the weir if $\mathrm{C}_{\mathrm{d}}=0.62$.
(b) A rectangular plane surface is 2 m wide and 3 m deep. It lies in vertical plane in water. Determine the total pressure and position of centre on the plane surface when its upper edge is horizontal and
a) coincides with water surface
b) 1.5 m below the free water surface.
Q-6 Attempt all questions(14)
(a) Differentiate between stream line and path line. ..... 05
(b) Explain the terms: ..... 05
(i) Pipes in parallel (ii) Pipes in series
(c) Calculate the capillary rise in a glass tube of 0.2 mm diameter when immersed ..... 04 vertically in water. Take surface tension of water in contact with air as $0.0725 \mathrm{~N} / \mathrm{m}$.
Q-7 Attempt all questions(14)
(a) Enumerate the practical applications of model analysis. ..... 04
(b) List the classification of orifice. ..... 03
(c) Explain the concept of buoyancy and metacenter with neat sketch. ..... 07
Q-8 Attempt all questions ..... (14)
(a) Explain Impulse momentum principal. ..... 05
(b) Obtain an expression for the force on the vertical plate moving in the direction of ..... 05jet when the jet of liquid strikes at the centre of the plate.
(c) Enlist the hydraulic co-efficient with formula. ..... 04

