

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C.U.SHAH UNIVERSITY

## Winter Examination-2015

**Subject Name:** Fluid Mechanics

**Subject Code:** 2TE03FLM1

**Branch:** Diploma(Civil)

**Semester:** 3

**Date:** 01/12/2015

**Time:** 2.30 To 5.30

**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.

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- Q-1 Attempt the following questions: (14)**
- a) Stoke is the unit of : (1)**  
(a) Surface tension (b) Dynamic viscosity  
(c) Kinematic viscosity (d) Force
- b) The coefficient of discharge  $C_d$ , in terms of  $C_v$  and  $C_c$  is : (1)**  
(a)  $C_d = C_v \times C_c$  (b)  $C_d = C_v / C_c$   
(c)  $C_d = C_c / C_v$  (d)  $C_d = 1 / C_v \cdot C_c$
- c) Hydraulic Gradient Line (H.G.L) represents the sum of : (1)**  
(a) Kinetic head and datum head (b) Pressure head, kinetic head and datum head  
(c) Pressure head and datum head (d) Pressure head and Kinetic head
- d) The rate of flow through a V-notch varies as : (1)**  
(a)  $H^{5/2}$  (b)  $H^{3/2}$  (c)  $H^{1/2}$  (d) H
- e) Reynold's number is defined as : (1)**  
(a) Ratio of inertia force to gravity force (b) Ratio of viscous force to gravity force  
(c) Ratio of viscous force to elastic force (d) Ratio of inertia force to viscous force
- f) For flow through pipe to be laminar, Reynolds number should be : (1)**  
(a) More than 3000 (b) More than 2000  
(c) Between 2000 and 4000 (d) Less than 2000
- g) Which of the following is not used as flow measuring device : (1)**  
(a) Orifice (b) Mouthpiece (c) Weir (d) Manometer
- h) In Bernoulli's equation, kinetic energy is : (1)**  
(a) Z (b)  $v^2 / 2g$  (c)  $p / w$  (d) none of the above
- i) In orifice , the co-efficient of discharge is (1)**  
(a) Actual Discharge/Area of orifice  
(b) Area of orifice / Actual Discharge



- (c) Theoretical Discharge/ Actual Discharge  
 (d) Actual Discharge/ Theoretical Discharge
- j)** Cippoletti weir is (1)  
 (a) a semi-circular weir (b) a trapezoidal weir -  $H : V = 1 : 4$   
 (c) a rectangular weir (d) a trapezoidal weir -  $H : V = 4 : 1$
- k)**  $dp/p + g dz + v dv = 0$  is an equation of motion given by (1)  
 (a) Bernoulli (b) Cauchy-Riemann (c) Laplace (d) Leonhard Euler
- l)** A pitot tube is used to measure : (1)  
 (a) pressure (b) difference in pressure  
 (c) velocity of flow (d) none of the above
- m)** In a venturimeter divergent cone is kept : (1)  
 (a) shorter than convergent cone (b) equal to convergent cone  
 (c) longer than convergent cone (d) none of the above
- n)** In C.G.S system the unit of viscosity is (1)  
 (a) poise (b) joule (c) newton (d) none of the above

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

- Q-2 Attempt all questions (14)**  
 (a) Define: 1. Density 2. Weight density 3. Sp. volume 4. Sp. Gravity (4)  
 (b) What is capillarity? Derive an expression of a capillary rise for water. (5)  
 (c) Explain different types of fluids. (5)
- Q-3 Attempt all questions (14)**  
 (a) Enlist pressure measuring equipments and explain Bourdon's tube pressure gauge with neat sketch. (5)  
 (b) Explain with line diagram atmospheric pressure, gauge pressure, absolute pressure and vacuum pressure. (4)  
 (c) Explain Pascal's Law with sketch. (5)
- Q-4 Attempt all questions (14)**  
 (a) Derive an equation of discharge for venturimeter with neat sketch. (7)  
 (b) Derive an equation of discharge for orifice meter with neat sketch. (7)
- Q-5 Attempt all questions (14)**  
 (a) Explain the Reynold's experiment with sketch. (6)  
 (b) Derive an equation for Total pressure and Centre of pressure for a plane body having vertically immersed surface. (6)  
 (c) Define Pressure and Pressure Head. (2)
- Q-6 Attempt all questions (14)**  
 (a) Differentiate between: (1) Laminar and turbulent flow. (5)



(2) Uniform flow and Non – uniform flow.      (3) Steady and unsteady flow.

- (b) State and explain continuity equation. (5)  
(c) State Bernoulli's theorem. And also Write their assumptions and limitations. (4)

**Q-7**      **Attempt all questions** (14)

(a) Explain various head losses in flow through pipes. (7)

(b) Derive an equation for the force exerted by the jet on a stationary vertical plate. (7)

**Q-8**      **Attempt all questions** (14)

(a) Convert the following pressure in  $\text{N/mm}^2$  (a) 9.1m height of oil column having specific gravity 0.91 (b) 10.33 m of water head (7)

(b) Convert following pressure head in to kilopascal unit. (7)

(1)108.8 meter of water.      (2) 8 meter of mercury of sp.gr. 13.6

(3)136 meter of oil of sp.gr.0.8

Is water, mercury and oil column are equivalent? If yes, why?



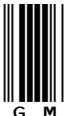











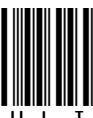
Q-1



Attempt the following questions:

(14)




a) (1)

Stoke       ?

(a)   (b)    (c)  

 (d) 

b) (1)

     $C_d$ , in terms of  $C_v$  and  $C_c$  is :

(a)  $C_d = C_v \times C_c$  (b)  $C_d = C_v / C_c$   
 (c)  $C_d = C_c / C_v$  (d)  $C_d = 1 / C_v \cdot C_c$

c) (1)

$\bar{a}$       :

(a)     $\emptyset \text{Å}$      $\emptyset \text{Å}$

(b)     $\emptyset \text{Å}$  ,     $\emptyset \text{Å}$   

  $\emptyset \text{Å}$

(c)     $\emptyset \text{Å}$      $\emptyset \text{Å}$

(d)     $\emptyset \text{Å}$      $\emptyset \text{Å}$



d) (1)

V-notch   :

(a)  $H^{5/2}$  (b)  $H^{3/2}$  (c)  $H^{1/2}$  (d)  $H$

e) Reynold's number is defined as : (1)

(a)   /   

(b)   /   

(c)   /   

(d)   /  

f) For flow through pipe to be laminar, Reynolds number should be : (1)




(a) More than 3000 (b) More than 2000  
(c) Between 2000 and 4000 (d) Less than 2000

g) (1)

        
   :





(a) Orifice (b) Mouthpiece (c) Weir (d) Manometer

h) In Bernoulli's equation, kinetic energy is : (1)

(a)  $Z$  (b)  $v^2 / 2g$  (c)  $p / w$  (d)   $\dot{E}$   

i) (1)

In orifice,     :

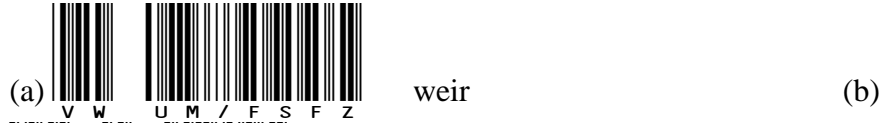
(a)     / Area of orifice (b) Area of orifice /





j) Cippoletti weir is (1)



k)  $dp/p+gdz+vdv=0$  is an equation of motion given by (1)

(a) Bernoulli (b) Cauchy-Riemann (c) Laplace (d) Leonhard Euler

l) (1)



m) (1)





(c) longer than



n)

In C.G.S system ,

સ્નિગ્ધતા



(1)

(a) poise

(b) joule

(c) newton

(d)



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

Q-2

Attempt all questions

(14)

(a) વ્યાખ્યા આપો: 1. ઘનતા 2. વજન ઘનતા 3. વિશિષ્ટ કદ 4. વિશિષ્ટ ઘનતા

(4)

(b) કેશાકર્ષણ એટલે શું? કેપીલરી ચઢાવ માટે નું સૂત્ર તારવો.

(5)

(c) ફ્લુઇડ ના પ્રકારો સમજાવો.

(5)

Q-3









Attempt all questions

(14)

(a) દબાણ માપવાના સાધનો ના નામ જણાવો. Barometer પ્રેસર ગેજ આકૃતિ સાથે સમજાવો.

(5)



- (b) સમજાવો :  , ગેજ ,
-   ,  

- (c) પાસ્કલ નો નીચમ આકૃતિ સાથે સમજાવો. (5)

**Q-4 Attempt all questions (14)**

- (a) Venturimeter માટે નિકાસ નું સૂત્ર આકૃતિ સાથે સમજાવો. (7)
- (b) Orifice meter માટે નિકાસ નું સૂત્ર આકૃતિ સાથે સમજાવો. (7)

**Q-5 Attempt all questions (14)**

- (a) Reynold નો પ્રયોગ આકૃતિ સાથે સમજાવો. (6)
- (b) પ્રવાહી માં ઉધ્વ રીતે ડુબાડેલી તકતી માટે કુલ દબાણ અને દાબ કેન્દ્ર માટે નું સૂત્ર તરવો. (6)
- (c) વ્યાખ્યા આપો: દબાણ અને દાબશીર્ષ (2)

**Q-6 Attempt all questions (14)**

- (a) તફાવત આપો: (6)
- (1) લેમીનાર and ટરબ્યુલન્ટ flow.
- (2) યુનિફોર્મ flow and નોનયુનિફોર્મ flow.
- (3) સ્ટેડી and અનસ્ટેડી flow.
- (b) સમજાવો : સાતત્ય સમીકરણ. (4)





(c) Bernoulli નો નીચમ સમજાવો. તેની પૂર્વધારણાઓ અને મર્યાદા સમજાવો. (4)

**Q-7 Attempt all questions (14)**

(a) નળી દ્વારા થતા પ્રવાહ ના શીર્ષ વ્યયો સમજાવો. (7)

(b) (7)



**Q-8 Attempt all questions (14)**

(a) નીચેના દબાણ ને  $N/mm^2$  માં બદલો. (a) 9.1 m ની ઉંચાઈ ધરાવતા 0.91 વિ. (7)

ઘનતાવાળા ઓઈલ સ્તંભ.

(b) 10.33 m પાણી ની ઉંચાઈ

(b) નીચેના દાબશીર્ષ ને કિલો પાસ્કલ એકમમાં ફેરવો. (7)

(1) 108.8 meter પાણી નો સ્તંભ. (2) 8 meter પારા નો સ્તંભ (13.6 વીશીષ્ટ ઘનતા)

(3) 136 meter ઓઈલ નો સ્તંભ. (0.8 વીશીષ્ટ ઘનતા)

પાણી, પારો અને ઓઈલ ના ઉપરોક્ત સ્તંભો સમકક્ષ સૂચવે છે? જો હા તો સા માટે?

