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GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST - 1

Even Semester: 2018-19 | **Date**: 06 March 2019

Course Code: CIV 208 | **Time**: 1 Hour

Course Name: Fluid Mechanics | **Max Marks**: 40

Programme & Sem: B.Tech (CIV) & IV Sem | **Weightage**: 20%

Instructions to the Student:

(i) Answer all the questions.
(ii) Use of non-programmable calculators is permitted.
(iii) Assume relevant data, wherever required.

Part A

Answer **all** the Questions. **Each** question carries **four** marks. (3Qx4M=12)

1. A plate 0.05 mm distant from a fixed plate moves at 12 cm/s and requires a shear stress of 2.2 N/m^2 to maintain this velocity. Find the viscosity of the fluid present between the plates.

2. A 20 mm diameter soap bubble has an internal pressure 0.30 kN/m^2 greater than the outside atmospheric pressure. Find the surface tension of soap-air interface.

3. Find the specific weight of a fluid on a planet where the acceleration due to gravity is 625 cm/s^2 by taking the mass density of the fluid as 1.3 g/cc.

Part B

Answer **both** the Questions. **Each** question carries **eight** marks. (2Qx8M=16)

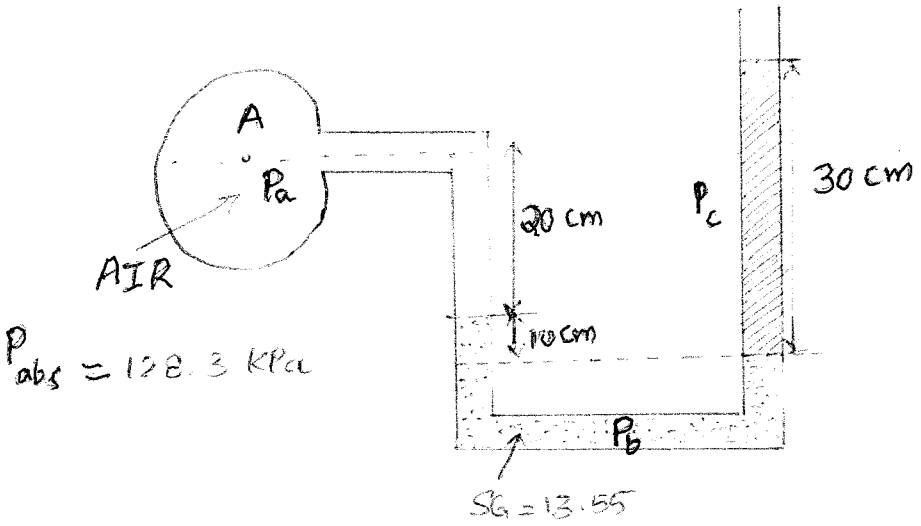
4. A tank 6 m deep contains 4 m of water and 2 m of oil of weight density 8600 N/m^3. Determine the gage pressure at the interface of oil and water with the help of a neat sketch.
5. (a) What is Capillarity? Explain when Capillary Rise and Fall occur.
   (b) Considering glass-water interface surface tension to be 0.00072 N/cm, find out the diameter of glass tube is required if the capillary effects in the tube should not exceed a rise of 10 mm.

P T O

Part C

Answer the Question. Question carries **twelve** marks. (1Qx12M=12)

6. A double fluid manometer is attached to an air pipe as shown in figure. If the specific gravity of one fluid is 13.55, find the specific gravity of the other fluid for the absolute air pressure indicated as shown. Take mass densities of air and water as 1.03 kg/m^3 and 1000 kg/m^3, respectively.



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GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST - 2

Even Semester: 2018-19
Course Code: CIV 208
Course Name: Fluid Mechanics
Program & Sem: B.Tech & IV Sem

Date: 16 April 2019
Time: 1 Hour
Max Marks: 40
Weightage: 20%

Instructions:
(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **both** the Questions. **Each** Question carries **five** marks. (2Qx5M=10)

1. Describe the conditions for stable, unstable and neutral equilibrium for both the floating and submerged bodies.

2. A triangular gate which has a base of 2m and altitude 3m lies in a vertical plane. The base of the gate is 1m below the surface of the tank (water surface). The tank contains fluid of specific gravity 0.8. Find the force exerted by the fluid on the gate and the position of the center of pressure.

Part B

Answer the Question. The Question carries **ten** marks. (1Qx10M=10)

3. A metal cube of size 20 cm, and specific gravity 9 is submerged in a two layered liquid, the bottom layer being mercury and the top layer being water, find the percentage of the volume of the cube remaining above the interface.

Part C

Answer **both** the Questions. **Each** Question carries **ten** marks. (2Qx10M=20)

4. For a three dimensional flow field described by $V = (y^2+z^2)\ i + (x^2+z^2)\ j + (x^2+y^2)\ k$, find at (1,2,3)
   a. The components of acceleration (Steady flow)
   b. The components of rotation (angular)

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PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

END TERM FINAL EXAMINATION

Even Semester: 2018-19
Course Code: CIV 208
Course Name: Fluid Mechanics
Program & Sem: B.tech & IV Sem

Date: 24 May 2019
Time: 3 Hours
Max Marks: 80
Weightage: 40%

Instructions:

(i) *Read the question properly and answer accordingly.*
(ii) *Question paper consists of 3 parts.*
(iii) Scientific and Non-programmable calculators are permitted.

Part A

Answer **all** the Questions. **Each** question carries **two** marks. (10Qx2M=20M)

1.

i. Dynamic viscosity has the following unit
a) m/S b)Kg/S c)N-S/m^2 d)Kg-S/m^2

ii. If the rate of change of velocity is 10 S^{-1} and Kinematic viscosity is 0.07 stokes and density= 1g/cc, then shear stress is (in N/m^2)
a)0.07 b) 7 c) 0.7 d)70

iii. The shape of water droplet of over leaf is spherical due to
a) Adhesion b) Cohesion c) Surface Tension d)Dynamic Viscosity

iv. If capillary fall in a tube of 2 mm diameter is 2 cm ,the height of capillary fall in tube of 1 mm diameter will be
a) 4 cm b) 2 cm c) 1 cm d) 6 cm

v. If U = (3x - 3y + 2Z and V = 2x + 3y -7Z),then the flow is
a)Possible b) Not possible
c) Depends on location d) Data not sufficient

vi. A triangular lamina with base 3 m and height 3m is immersed in water vertically with base parallel to water surface and vertex touching the water surface .What is the total force acting on the face of lamina (g = 10 ms^{-2})
a) 90 KN b) 67.5 KN c) 135 KN d) 180 KN

vii. A circular plate of diameter d I submerged in water vertically ,so that the top most point is just at the water surface .The center of pressure of the plate will be below the water surface at the depth

a)5d/8 b) 11d/6 c) 2d/3 d) 3d/4

viii. An ice cube is floating in a beaker full of water. Water touches the rim of beaker .When ice cube melts, then

a) Water will flow out of water b)Water level will decrease
c)Water level will remain the same d)None of the above

ix. A flow which doesn't change with time and one which doesn't change with space are respectively

a) Unsteady and uniform b)Steady and Non- uniform
c)Uniform and Steady d)Steady and Uniform

x. Bernoulli's equation is based on the

a)Conservation of Energy equation b) Conservation of Momentum
c)Conservation of mass d)None of the above

Part B

Answer **all** the Questions. **Each** question carries **ten** marks. (3Qx10M=30M)

2. A pipeline of constant diameter 0.25 m carrying water and length 1600 m ,has a slope of 1 in 200 for the first 800 m and 1 in 100 for the next 800.The pressure at the upper end of the pipe line is 107 KPa and the lower end is 54 KPa .Taking friction factor as 0.032 ,determine the discharge through the pipe ,considering only friction loss.

3. Two pipes of length 3 km each, and diameters 80 cm and 60 cm respectively are connected in parallel .The friction factor of each pipe is 0.024 .The total discharge is 300 litres per second .Find the discharge in each pipe.

4. A 0.3 m diameter pipe carries oil of specific gravity 0.8 at the rate of 200 litres per second and the pressure at a point is 20 Kpa .If the point A is 3.5 m above the datum line ,calculate the total energy at point A in meters of oil ,also the piezometric head .

Part C

Answer **all** the Questions. **Each** question carries **ten** marks. (3Qx10M=30M)

5. A Venturimeter having a 75 mm diameter at the throat and 150 mm diameter at the enlarged end is installed in a horizontal pipeline 150 mm diameter carrying an oil of specific gravity 0.9. The difference of pressure head between the enlarged end and the throat recorded by a U Tube is 200 mm of mercury .Determine the discharge through the pipe .Assume the coefficient of discharge of the meter as 0.99.

6. A pipeline ABC 180 m long is laid on an upward slope of 1 in 60 .The length of the portion AB is 90 m and its diameter is 0.15 m .At B the pipe section suddenly enlarges to 0.3 m diameter and remains the so for the remainder of the length BC 90 m. A flow of 50 litres per second of water is pumped into the pipe at its lower end A and is discharged at the upper end c into a closed tank.The pressure at the supply end A is 137.34 KPa .Find the pressure at the discharge end C.Take f= 0.02 , The co-efficient loss due to expansion is 1 .(Consider all the losses except entry and exit loss)

7. The jet of fluid whose specific gravity is 2 ,the diameter of jet is 0.5 m and velocity is 1200 m/min. Calculate the force on the vane due to the jet for the following condition

a. The vane is stationary and held normal to the jet.

b. The vane is making an angle 60 degree with the vertical.(Normal force,F_x and F_Y)

c. The vane is moving with a velocity 500 cm/s towards the jet

d. The vane is moving with a velocity 2000 mm/sec away from the jet

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PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

SUMMER TERM / MAKE UP END TERM EXAM EXAMINATION

Semester: Summer Term 2019 | **Date**: 23 July 2019

Course Code: CIV 208 | **Time**: 2 Hour

Course Name: FLUID MECHANICS | **Max Marks**: 80

Program & Sem: B.Tech (CVE) & IV Sem (2016 Batch) | **Weightage**: 40%

Instructions:

(i) *Read the question properly and answer accordingly.*
(ii) *Question paper consists of 2 parts.*
(iii) Scientific and Non-programmable calculators are permitted.

Part A

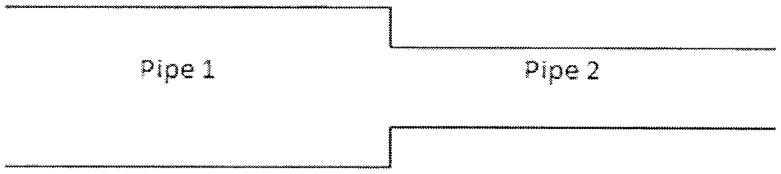
Answer **all** the Questions. **Each** question carries **ten** marks. (4Qx10M=40)

1. A 0.25 m diameter pipe carries oil of specific gravity 0.99 at the rate of 200 liters per second and the pressure at a point is 25 Kpa .If the point A is 3.5 m above the datum line, calculate the total energy at point A in meters of oil ,also the piezometric head .

2. Classify the different types of losses for a flow of fluid through pipe, with the equations.

3. Find the pressure at section 2-2, if the pressure at the section 1-1 is 20 KPa, and the fluid is water ,flowing at rate 100 lps through the pipe, the diameter of the pipe throughout is 10 cm. The pipe is at an elevation 5 m above the ground, placed horizontally. Ignore all the losses.

4. Find the total head loss for the given pipe system below, the flow is from pipe 1 to pipe 2,the diameter of pipe 1 and pipe 2 is 10 cm and 5 cm respectively, the length of pipe 2 is twice that of the pipe 1,length of pipe 1 is 2 m. Take co-efficient of friction for both the pipes as 0.01 and the discharge through pipe is 150 litres per second (lps).Take K = 1, for the losses



Part B

Answer **all** the Questions. **Each** question carries **ten** marks. (4Qx10M=40)

5. A Venturimeter having a 75 mm diameter at the throat and 150 mm diameter at the enlarged end is installed in a horizontal pipeline 150 mm diameter carrying an oil of specific gravity 0.9. The difference of pressure head between the enlarged end and the throat recorded by a U Tube is 200 mm of mercury (Manometric elevation difference) .Determine the discharge through the pipe .Assume the coefficient of discharge of the meter as 0.99.

6. The jet of fluid whose specific gravity is 3, the diameter of jet is 0.1 m and velocity is 1200 m/min. Calculate the force on the vane due to the jet for the following condition

   a. The vane is stationary and held normal to the jet.

   b. The vane is making an angle 60 degree with the horizontal (Normal force, F_x and F_Y)

   c. The vane is moving with a velocity 500 cm/s towards the jet

   d. The vane is moving with a velocity 2000 mm/sec away from the jet

7. a) What are the forces causing the motion of fluid in a pipe, and write the equation used to study the fluid Dynamics

   b) A Pipe tapers from diameter 100 mm to 50 mm ,the velocity at the section 100 mm diameter is 1m/s ,find the discharge through the pipe and also the velocity at section 50 mm diameter.

8. Find the head loss due to friction through a pipe of 3 km with water flowing through the pipe at a rate 1000 lps, the diameter of the pipe is 0.5 m.The frictional factor of the pipe is 0.04.