

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2019- 20 Examination

Semester: 3
Subject Code: 203120205
Subject Name: Fluid Flow Operations

Date: 29/11/2019
Time: 2.00 pm to 4.30 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions -**(15)**

1. The rate of flow through a venturimeter varies as
a) H b) \sqrt{H} c) $H^{\frac{3}{2}}$ d) $H^{\frac{5}{2}}$
2. Give the statement of Pascal's Law?
3. The fluid which have a positive value of Yield point is _____ fluid
a) Bingham or ideal plastic
b) Dilatent fluid
c) Ideal fluid
d) None of the above
4. Specific gravity is _____ kind of fluid property
5. What is compressible flow ?
6. Reynolds number is defined as
a) ratio of inertial force to viscous force
b) ratio of viscous force to gravity force
c) ratio of viscous force to elastic force
d) ratio of inertial force to viscous force
7. _____ method is used for calculation of fluid motion is fluid kinematics.
8. _____ the mathematical expression for Reynold number.
9. Write the dimensional formula for Specific volume?
10. dp/dt is _____ for unsteady state flow conditions.
11. Which of the following is true for a steady flow system?
a) mass entering = mass leaving
b) mass does not enter or leave the system
c) mass entering can be more or less than the mass leaving
d) none of the mentioned
12. The co-efficient of friction(f) for laminar flow is _____.
13. The flow in pipe is laminar if the Reynolds number is
a) less than 2000
b) equal to 2500
c) greater than 4000
d) none of the above
14. Poise is a unit of _____.
15. Bernoulli's equation cannot be applied when the flow is
a) rotational
b) turbulent
c) unsteady
d) all of the above

Q.2 Answer the following questions. (Attempt any three)**(15)**

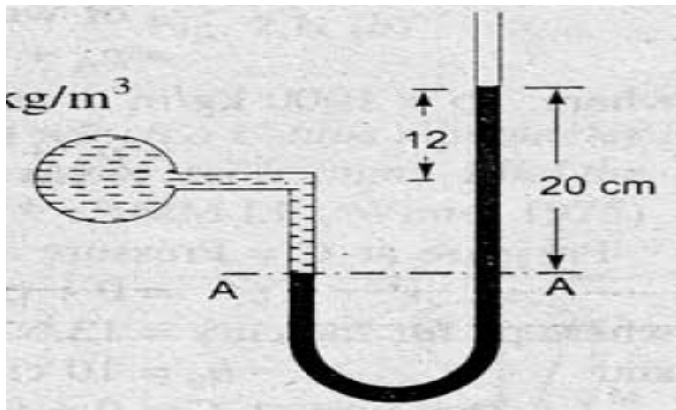
- A) Calculate the rate of flow(m^3/sec) in a horizontal pipe of 60mm diameter in which oil of viscosity 9poise and specific gravity 0.9 is flowing. If the pressure drop in 100m length of pipe is $1800KN/m^2$. Also calculate the centre-line velocity of the flow .
- B) In a falling sphere viscometer , a lubricating oil of density $900kg/m^3$ was placed in a 80mm

inside diameter tube. A 10mm diameter steel ball of density 8000kg/m^3 was found to travel a distance of 950mm in 19sec. Determine the viscosity of oil?

- C) What is positive displacement pump? The head of water over the centre of an orifice of diameter 20mm is 1m. The actual discharge thru the orifice is 0.85l/s. Find the co-efficient of discharge (Actual/Theoretical).
- D) Calculate the specific weight, specific mass, specific volume and specific gravity of a liquid having a volume of 6m^3 and weight of 44kN.

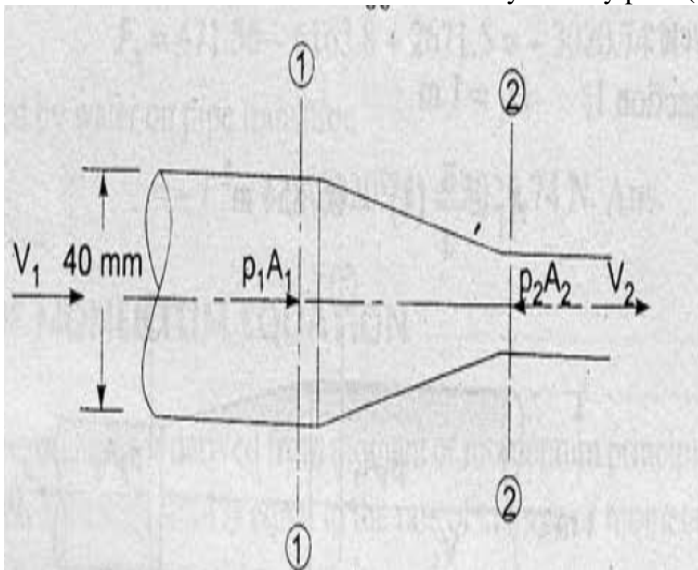
[Note- All the dimensional should be in MKS Units]

- Q.3 A) Write a short note on Efflux viscometer with diagram? (07)
- B) The right limb of a simple U-tube manometer containing mercury is open to the atmosphere (08) while the left limb is connected to pipe in which a fluid of specific gravity 0.9 is flowing. The centre of the pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20cm.



OR

- B) A nozzle of diameter 20mm is fitted to a pipe of diameter (08) 40mm. Find the force exerted by the nozzle on the water which is flowing through the pipe at the rate of $0.2\text{m}^3/\text{sec}$. Calculate the velocity at entry point (1) and exit point (2)?



- Q.4 A) What is Newton's law of Viscosity. Explain the Shear stress vs Velocity gradient of different (07) kinds of fluids?

OR

- A) Water is flowing thru a pipe having diameters 600mm and 400mm at the bottom and upper end (07) respectively. The intensity of pressure at the bottom end is 350KN/m^2 . And the pressure at the upper end is 100KN/m^2 . Determine the difference in datum head if the rate of the flow thru the pipe is 60litres/sec.

- B) In a pipe of 300mm diameter and 800m length an oil of specific gravity 0.8 is flowing at the rate (08) of $0.45\text{m}^3/\text{sec}$. Assume the kinematic viscosity of the oil ($\frac{\mu}{\rho}$) is $0.3 \times 10^{-4} \text{m}^2/\text{sec}$. Calculate the Reynolds Number?