

**KERALA AGRICULTURAL UNIVERSITY**  
**B.Tech (Food. Engg) 2012 Admission**  
**III<sup>rd</sup> Semester Final Examination- December /January -2013**

**Cat. No: Cien.2105**  
**Title: Fluid Mechanics (2+1)**

**Marks: 80**  
**Time: 3 hours**

**I. Fill in the blanks** **[ 10 x 1 = 10 marks ]**

1. SI unit of viscosity is .....
2. The reciprocal of mass density is known as .....
3. One atmosphere = ..... mm of Hg.
4. When the Reynolds number is greater than ....., the flow in pipes is said to be turbulent.
5. .... is an instantaneous picture of the positions of all particles in the flow which have passed through a given point.
6. Pitot tube is an instrument used for measuring ----- of pipe flow.
7. ----- is preferred for measuring the discharge in pipes when the space is limited.
8. Centrifugal pump is a ..... (positive displacement / variable displacement) pump.
9. .... is used for lifting water without any external power for its operation, when large amount of water is available at a small height.
10. For ideal fluids, the value of viscosity is .....

**II. Write short notes on ANY TEN of the following.** **[ 10 x 3 = 30 marks ]**

1. Laminar flow
2. Newtonian fluid
3. Stoke's law
4. Boundary layer
5. Hydraulic head
6. Von Karman Equation
7. Butterfly valve
8. Water hammer
9. Venturimeter
10. NPSH
11. Drag coefficient

12. Relationship between Absolute pressure, Vacuum Pressure and Atmospheric pressure.

**III. Answer ANY SIX of the following questions**

**[6 x 5 = 30 marks ]**

1. State and prove the Bernoulli's equation.
2. The velocity distribution for a flow over a flat plate is given by  $u = \frac{3}{4}y - y^2$  in which  $u$  is the velocity in m/s at a distance  $y$  metres above the plate. Determine the shear stress at  $y = 0.20$  m. Take dynamic viscosity of fluid as 8.6 poise.
3. A pipe contains an oil of specific gravity 0.8. A differential manometer connected at the two points A and B of the pipe shows a difference in mercury level as 20 cm. Find the difference of pressure at the two points.
4. A stone weighs 392.4 N in air and 196.2 N in water. Compute the volume of stone and its specific gravity.
5. 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 the inlet and the throat is 20 cm of mercury. Determine the rate of flow. Take  $C_d = 0.98$ .
6. List the major components of a centrifugal pump. With the help of a neat sketch explain the working principle of a centrifugal pump.
7. Calculate the discharge through a pipe of diameter 200 mm when the difference of pressure head between the two ends of pipe 500 m apart is 4 m of water. Take the value of 'f' as 0.009.
8. Distinguish between the following;
  - a). compressible and incompressible fluid
  - b). Kinematic viscosity and dynamic viscosity
  - c). Density and Specific gravity

**IV. Answer ANY ONE of the following**

**[ 1 x 10 = 10 marks ]**

1. Give a detailed classification of pumps. Describe the working principle of a jet pump with the help of a neat sketch. Also mention the circumstances under which jet pump is preferred over the centrifugal pump.
2. List the different methods for the measurement of fluid pressure. Explain the types of devices used for measuring the difference of pressure between two points in a pipe or in two different pipes.