KERALA AGRICULTURAL UNIVERSITY
B.Tech (Food.Engg.) 2015 Admission
IIIrd Semester Final Examination-January-2017

Cat. No: Cien.2105.   Marks: 50.00
Title: Fluid Mechanics (2+1)   Time: 2 hours

I Fill in the blanks/ Match the following/ State true or False/ Define   (10x1=10)
1. Real fluids are compressible (True/ False)
2. A fluid having Reynolds number 1268 is Laminar flow. (True/ False)
3. Define vortex flow
4. Define specific weight
5. N/ m 3 are the unit for?
6. What is coefficient of discharge?
7. Define manometric head
8. How are Notches classified?
9. Orifice meter is a _____ measuring device
10. When the fluid is at motion, the shear stress is _____

II Write short notes/answers on any FIVE of the following   (5x2=10)
1. What is drag coefficient?
2. What is difference between adiabatic process and isothermal process
3. What is Kinematic viscosity and dynamic viscosity? Explain with example.
4. Define NPSH
5. What is the volumetric and mass flow rate of water flowing through a pipe which fill a 5L capacity bucket in 8 min.
6. How does viscosity of fluid vary with temperature
7. Define Stokes Law

III Write short answers on any FIVE   (5x4=20)
1. Define manometers and explain any two types of manometer.
2. A 15cm long cylindrical metal rod slides inside a tube filled with oil. The inner diameter of the tube is 5cm and the clearance is 0.05 mm. the mass of the bar is 0.5 kg when immersed in the oil. What is the viscosity of the oil, if the steady-state velocity of the rod is 0.1 m/s?
3. With a neat sketch, derive the coefficient of discharge for venturimeter.
4. A pump draws a solution of specific gravity 1.84 from a storage tank through a 3-in. (75-mm) Schedule 40 steel pipe. The efficiency of the pump is 60 percent. The velocity in the suction line is 3 ft/s (0.914 m/s). The pump discharges through a 2-in. (50-mm) Schedule 40 pipe to an overhead tank. The end of the discharge pipe is 50 ft (15.2 m) above the level of the solution in the feed tank. Friction losses in the entire piping system are 10ft-lb f /lb (29.9 J/kg). What pressure must the pump develop? What is the power of the pump?
5. Derive Hagen-Poiseuille equation.
6. Draw a neat sketch of Gate valve
7. A smooth, horizontal plate 2000 mm long and 1400 mm wide is exposed on one of its sides to a flowing stream of water moving with a velocity of 1.2 m/min. Find the thickness of the boundary layer and shear stress 1500 mm from the leading edge of the plate. Also calculate the total drag force on the plate. Dynamic viscosity of water = 1004×10^{-6} kg/m.s. Density of water = 1000 kg/m^3.

IV Write essay on any ONE   (1x10=10)

1. A spherical lead particle of diameter 0.1 mm is allowed to settle in a medium of density1000 kg/m^3. Calculate the distance it will move before it reaches 99% of its terminal settling velocity. Assume Stoke's law applicable under the prevailing conditions, Dynamic viscosity of the medium = 0.001 Pa Density of lead = 11400 kg/m^3.

2. Write a detailed account of Centrifugal pump, describing its working, various part, empirical equation along with a neat labeled diagram.

****