



**KERALA AGRICULTURAL UNIVERSITY**  
**B.Tech.(Food Engg.) 2016 Admission**  
**III Semester Final Examination-January-2018**

Cien.2105

**Fluid Mechanics (2+1)**

**Marks: 50**  
**Time: 2 hours**  
**(10x1=10)**

**I Fill in the blanks**

- 1 The path taken by the smoke coming out of a chimney (in concentric circles) represents a -----
- 2 When external torque is absent the type of vortex flow is -----
- 3 If layers of fluid have frictional force between them, then it is known as -----
- 4 A racing car has a body with-----
- 5 Mach number is a ratio of inertia forces to -----

**State True or False**

- 6 Equation of motion for vortex flow does not take into account centrifugal force.
- 7 The meta centric height is affected by the change in density.
- 8 In case of any orifice, velocity always remains constant and hence discharge can be calculated.
- 9 The orifice meter readings are more accurate than pitot tube readings.
- 10 Eddies formed in the turbulent flow are major cause of the energy loss in the turbulent flow.

**II Write Short notes on any FIVE of the following**

**(5x2=10)**

- 1 What is meant by boundary layer growth?
- 2 State the limitations of dimensional analysis.
- 3 Define Slip of reciprocating pump. When the negative slip does occur?
- 4 Define eddy viscosity. How it differs from molecular viscosity?
- 5 Define velocity potential function and stream function.
- 6 Explain the terms skin friction drag and pressure drag.
- 7 Explain Reynolds stresses.

**III Answer any FIVE of the following.**

**(5x4=20)**

- 1 Explain different types of similarities.
- 2 Describe briefly the momentum method for finding the velocity coefficient of an orifice.
- 3 Show that the mean velocity in a pipe with fully developed turbulent flow is 49/60 of the maximum velocity. Assume the  $1/7^{\text{th}}$  law.
- 4 Discuss the advantages of stop/start controller in case of pumps.
- 5 Find the kinematic viscosity of an oil having density  $981 \text{ kg/m}^3$ . The shear stress at a point in oil is  $0.2452 \text{ N/m}^2$  and velocity gradient at that point is 0.2 per second.
- 6 How the velocity at any point is determined with the help of pitot tube?
- 7 A small thin plane surface is pulled through the liquid filled space between two large horizontal planes in the parallel direction. Show that the force required will be minimum if the plate is located midway between the planes.

**IV Write an essay on any ONE of the following**

**(1x10=10)**

- 1 What is the significance and the role of the following parameters?
  - a Froude number
  - b Reynolds number
- 2 The velocity distribution inside a laminar boundary layer over a flat plate is described by the cubic law  $u/u_1 = a_0 + a_1y + a_2y^2 + a_3y^3$ .  
Show that the momentum thickness is  $39\delta/280$ .

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