Reg. No. : | | | | | | | | | | |

Question Paper Code: 51135

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Third Semester

Civil Engineering

15UCE305 - FLUID MECHANICS

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Property of a fluid by which molecules of different kinds of fluids are attracted to each other is called

    (a) Adhesion   (b) Cohesion   (c) Viscosity   (d) Compressibility

2. The path followed by a fluid particle in motion

    (a) Path line   (b) Stream line   (c) Streak line   (d) Stream tube

3. When the velocity distribution is uniform over the cross section, the correction factor for momentum is

    (a) 0   (b) 1   (c) 4/3   (d) 2

4. Velocity head is given by

    (a) V   (b) $V^2/2g$ (c) v/2g   (d) V^2/g

5. The ratio of all corresponding linear dimension in the model and prototype are equal in

    (a) Geometric similarity   (b) Dynamic similarity
    (c) Kinematic similarity   (d) Model analysis

PART - B (5 x 3 = 15 Marks)

6. Differentiate between Newtonian and Non-Newtonian fluid.

7. What is flow line? List the types of flow line.

8. Define momentum correction factor.

9. How will you determine the loss of head due to friction in pipes?

10. Give the reason for adopting distorted models.

PART - C (5 x 16 = 80 Marks)

11. (a) Briefly explain the surface tension and calculate surface tension for soap bubble, water droplet and liquid jet. (16)

Or

(b) A U tube manometer is used to measure the pressure of oil of specific gravity 0.95 flowing in the pipe line.its left end is connected to the pipe and the right limb is open to the atmosphere.The centre of pipe is 90*mm* below the level of mercury(S=13.6) in the right limb.if the pressure difference of the mercury level in the two limbs is 150*mm*. Determine absoulte pressure of oil in the pipe. (16)

12. (a) Derive the continuity equation in cartesian co-ordinates for two dimensional steady incompressible fluid flow. (16)

Or

(b) A Venturimeter with inlet and throat diameter 320*mm* and 150*mm* respectively is used to measure the flow of water. The pressure intensity at inlet is 145*kN/m²* while the vacuum pressure head at throat is 350mm of mercury. Determine the rate of flow. Take Cd = 0.95. (16)

13. (a) For the laminar boundary layer, the velocity distribution is given by $u/U = 2(y/\delta) - (y/\delta)^2$. Compute the displacement thickness, energy and momentum thickness. (16)

Or

(b) What is separation of boundary layer? When it occur? Discuss the method of control the separation of boundary layer. (16)

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14. (a) A laminar flow is taking place in a pipe of diameter 200*mm*. The maximum velocity is 1.5*m/s*. Find the mean velocity and the radius at which this occurs.also calculate the velocity at 4*cm* from the wall of the pipe. (16)

Or

(b) A horizontal pipe 200*mm* in diameter is joined by sudden enlargement to 400*mm* diameter pipe, water is flowing through it at the rate of 0.25*m³/s*. Pressure intensity in the smaller pipe is 11.772 *N/cm²*. Find,
    (i) Loss of head due to abrupt expansion.
    (ii) Pressure intensity in the large pipe.
    (iii) Power lost due to enlargement. (16)

15. (a) Using Buckingham's π theorem, show that the velocity through a circular orifice is given by V=$\sqrt{2GH}$ ϕ ($\frac{D}{H}$,$\frac{\mu}{\rho VH}$). Where, H-head causing flow, D-diameter of orifice, μ-coefficient of viscosity, G-acceleration due to gravity, ρ-mass density. (16)

Or

(b) Briefly, explain the similitude and types forces acting in moving fluid. (16)

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