Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech. Summer 2019 Examination

Semester: 4 **Date: 01/05/2019**

Subject Code: 03104252 **Time: 02:00pm To 04:30pm**

Subject Name: Fluid Mechanics-II **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** - (Fill in the blanks, one-word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) **(15)**

1.The dimensions $M^0L^1T^{-1}$ refers

a.) Mass, b.) Specific Weight, c.) Velocity, d.) None of the above

2. Reynold's number is the ratio of inertia force to

a.) Surface Tension Force, b.) Gravitational Force, c.) Pressure Force, d.) Viscous Force

3. Manning's formula is used for

a.) flow in open channels b.) Flow in pipes c.) Head lost due to friction in open channels iv. d) head lost in pipes running full

4.The velocity at critical depth is called as

a.) Critical Velocity b.) Super critical Velocity c.) Sub Critical velocity d.) None

5. Specific energy (E) in open channel flow is the sum of

a.) Potential energy and kinetic energy b.) kinetic energy and pressure energy c.) potential energy and pressure energy d.) potential energy, pressure energy and kinetic energy.

6. For critical flow, the Froude number is_____.

7. The value of kinetic energy correction factor (a) for a laminar flow through a circular pipe, is___.

8. Euler number is the ratio of Square root of inertia force and _____.

9. The expression for friction factor for viscous flow through a circular pipe _____.

10. The friction factor (f) in case of partially turbulent flow in smooth pipes is given by_____.

11. Define Back Water Curve.

12. What are the forces acting in a moving fluid?

13. If k/δ' is less than 0.6, the boundary is _____.

14. Define Terminal Fall Velocity.

15. Define velocity defect.

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

A) Classify different types of open channel flow. Explain any two classifications.

B) Describe Reynold's experiment.

C) Explain the following:(i) Model, (ii) Dimensional Analysis, (iii) Fundamental Quantity,(iv) Derived Quantity, (v) Dimensional Homogeneity

D) Define Gradually Varied Flow. What are the assumptions made in deriving the equation for gradually Varied Flow?

Q.3 A) Define Most Economical Section. Derive the condition for most economical section for a rectangular channel **(07)**

B) A flat plate 1.6m × 1.6m moves at 70kmph in stationary air of density 1.17 kg/m^3. If the co-efficient of drag and lift are 0.17 and 0.73 respectively, determine: (i) The lift force, (ii) The drag force, (iii.) The resultant force and (iv.) The power required to keep the plate in motion. **(08)**

OR

B) A smooth pipe of diameter 15cm is carrying water at the rate of 30 m^3/hr. Compute the wall shearing stress, center-line velocity, velocity at 2cm from pipe wall. Also calculate the thickness of laminar sub layer if kinematic viscosity of water is 0.012 stokes. The friction factor is given by following relation; $f = 0.316/ (R_e)^{1/4}$ **(08)**

Q.4 A) Briefly explain the following terms: (i) Energy Thickness, (ii) Displacement Thickness, (iii) Momentum Thickness. **(07)**

OR

A) State and derive the expression for dimensional analysis using Buckingham's π-theorem. **(07)**

B) The discharge of water through a rectangular channel of width 6m is 20 m3/s, when the depth of flow of water is 1.5m. Calculate: (i) Specific energy of flowing water, (ii) Critical depth and Critical Velocity, (iii) Value of minimum specific energy. **(08)**