

R13

Code No: 113BK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, November - 2015

FLUID MECHANICS

(Common to CE, CEE)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A**(25 Marks)**

- 1.a) What is Pascal's law? Explain. [2M]
- b) List out different fluid properties along with their significance. [3M]
- c) What do you mean by rotational and irrotational flows? [2M]
- d) Distinguish between fluid Kinematics and Fluid Dynamics. [3M]
- e) Distinguish between Orifice meter and venture meter. [2M]
- f) What is broad crested Weir? [3M]
- g) Explain the Magnus effect. [2M]
- h) What is Prandtl contribution? [3M]
- i) How do you distinguish laminar and turbulent flows? [2M]
- j) What is Reynold's number? What is its significance? [3M]

PART-B**(50 Marks)**

- 2.a) Distinguish between:
 - i) Standard and local Atmospheric pressures
 - ii) Barometric pressure and Absolute pressure and
 - iii) Absolute pressure and Gauge pressure.
 - b) Derive an equation for hydrostatic force on inclined plane. [5+5]
- OR**
- 3.a) Define Viscosity, Surface tension and Vapor Pressure and explain their influence on fluid motion.
 - b) An open tank contains water up to a depth of 1.5 m and above it an oil of sp.gr.0.8 for a depth of 2 m. Find the pressure intensity:
 - i) at the interface of the two liquids, and
 - ii) at the bottom of the tank. [5+5]
- 4.a) Describe stream line, streak line and path line.
 - b) The water is flowing through a pipe having diameters 20cm and 15 cm at sections 1 and 2 respectively. The rate of flow through pipe is 40 litres/s. The section 1 is 9 m above datum line and section 2 is 5 m above the datum. If the pressure at section 1 is 32.40 N/cm^2 , find the intensity of pressure at section 2. [5+5]
- OR**
- 5.a) What is the difference between stream function and velocity potential function?
 - b) Describe Eulerian and Lagrangian approaches. [5+5]

- 6.a) Describe different types of notches with neat sketches.
b) A 22cm diameter pipe carries water under a head of 10 metres with a velocity of 7m/s. If the axis of the pipe turns through 45° , find the magnitude and direction of the resultant force at the bend. [5+5]

OR

- 7.a) State and derive the Bernoulli equation as an energy equation, mentioning clearly the assumptions made in the derivation. What are its limitations?
b) A 50° reducing elbow having an inlet diameter 25 cm and outlet diameter 15cm is fitted in a horizontal pipe line. If the rate of flow through the pipe is 150 litres/second, and inlet pressure is 1.00kg/cm^2 , find the components of the forces necessary to hold the bend in position. Also find the resultant force and the direction in which it acts. [5+5]
- 8.a) What conditions should be satisfied for separation of boundary layer? Discuss briefly the methods that can be used to prevent separation.
b) How will you determine whether a boundary layer flow is attached flow or detached flow or on the verge of separation? [5+5]

OR

- 9.a) With a neat sketch, analyze the flow around submerged body.
b) What do you mean by boundary layer separation? What is the effect of pressure gradient on boundary layer separation? [5+5]
- 10.a) What do you understand by 'minor and major losses' in pipes? Explain them in brief.
b) Derive an expression for head loss due to friction. [5+5]

OR

- 11.a) Derive an expression from the fundamentals for the loss of head at a sudden contraction in a pipe line.
b) The rate of flow of water through a horizontal pipe is $0.2\text{ m}^3/\text{s}$. The diameter of the pipe is suddenly enlarged from 200 mm to 400 mm. The pressure intensity in the smaller pipe is 12.5 N/cm^2 . Determine:
i) loss of head due to sudden enlargement
ii) pressure intensity in the large pipe and
iii) power lost due to enlargement. [5+5]

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