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 Eularian 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 50^0 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 m^3/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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