R16

Code No: 133AV

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, April/May - 2018

FLUID MECHANICS – I

(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)	Differenciate between atmospheric pressure and gauge pressure.	[2]
b)	Explain the terms- intensity of pressure and pressure head.	[3]
c)	Explain the terms: Metacentre and metacentric height.	[2]
d)	Write short notes on rotational and irrotational flows.	[3]
e)	What are the applications of momentum equation?	[2]
f)	Define the terms forced vortex and free vortex flow.	[3]
g)	What do you understand by total energy line, hydraulic gradient line?	[2]
h)	Explain the terms Pipes in parallel and series.	[3]
i)	Explain the concept of boundary layer.	[2]
j)	How is the flow in boundary layer controlled?	[3]

PART-B

(50 Marks)

2.a) Briefly explain the principle employed in the manometers used for the measurement of pressure.

b) State the advantages of mechanical pressure gauges over the manometers. [5+5]

OR

3.a) Describe with the help of neat sketches, different types of manometers.

b) A vertical gap 2.2 cm wide of infinite extent contains a fluid of viscosity 2.0 N s/m^2 and specific gravity 0.9. A metallic plate 1.2m × 1.2m × 0.2 cm is to be lifted up with a constant velocity of 0.15 m/sec, through this gap. If the plate is in the middle of the gap, find the force required. The weight of the plate is 40N. [5+5]

4.a) Describe briefly the experimental method of determination of the metacentric height of a floating object.

b) What is a flow net? What are its uses? Give examples. [5+5]

OR

5.a) Velocity potential of a certain flow field is given as: $\emptyset = 4xy$. Check whether the stream function exists or not? If exists, obtain an expression for stream function for the flow. Sketch the streamline of the flow.

b) Explain the following terms in brief: i) Circulation ii) Vorticity. [5+5]

6.a) Derive Bernoulli's equation from Euler's equation of motion.

b) During an experiment in a laboratory, $0.05m^3$ of water flowing over a right-angled notch was collected in one minute. If the head of the sill is 50 mm, calculate the co-efficient of discharge of the notch. [5+5]

OR

7.a) Derive Euler's equation of motion.

b) Why is co-efficient of discharge of an orifice meter much smaller than that of venturimeter? [5+5]

8. A pipeline 0.225 m in diameter and 1580 m long has a slope of 1 in 200 for the first 790 m and 1 in 100 for the next 790m. The pressure at the upper end of the pipeline is 107.91 kP_a and at the lower end is 53.955 kP_a. Taking f= 0.032, determine the discharge through the pipe. [10]

OR

9.a) What is meant by water hammer? Obtain an expression for the rise in pressure in a thin elastic pipe of circular section in which the flow of water is stopped by sudden closure of valve.

b) How will you determine the loss of head due to friction in pipes by using Darcy formula? [5+5]

10. State the assumptions under which the boundary layer equations for flow over a flat plate are valid. Explain with a neat sketch the boundary layer characteristics when a fluid is flowing over a flat plate. [10]

OR

11. Obtain Von-Karman momentum integral equation. [10]

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