

Code No: 123BK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March 2017

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) Explain hydrostatic law. [2]
- b) Explain vacuum pressure. [3]
- c) Define steady and unsteady flow. [2]
- d) Explain stream and velocity potential functions. [3]
- e) List the assumptions of Euler's equation of motion. [2]
- f) Write down the disadvantages of orifice meter. [3]
- g) What is Magnus effect? [2]
- h) Write a brief note on Prandtl contribution. [3]
- i) List the characteristics of turbulent flow. [2]
- j) Explain total energy line. [3]

PART - B

(50 Marks)

- 2.a) Define the following:
 - i) Atmospheric pressure
 - ii) Gauge pressure
 - iii) Vacuum pressure and
 - iv) Absolute pressure
- b) What are mechanical gauges? Name three important mechanical gauges. [5+5]

OR

- 3.a) Define the following terms:
 - i) Total pressure, and
 - ii) Centre of pressure.
- b) Derive expression for total pressure and centre of pressure for a vertically immersed surface. [5+5]

4. Find the velocity and acceleration at a point (1, 2, 3) after 1 sec, for a three dimensional flow given by $u = yz + t$, $v = xz - t$, $w = xy$ m/s. [10]

OR

5. Describe in detail the classification of flows given one example for each category. [10]

6. A 300 mm × 150 mm venturimeter is provided in a vertical pipeline carrying oil of specific gravity 0.9, flow being upward. The difference in elevation of the throat section and entrance section of the venturimeter is 300 mm. The differential U-tube mercury manometer shows a gauge deflection of 250 mm. Calculate:

- The discharge of oil, and
 - The pressure difference between the entrance section and the throat section.
- Take the co-efficient of meter as 0.98 and specific gravity of mercury as 13.6.

[5+5]

OR

7. Discuss in detail the classification of orifices and notches.

[10]

8. Define the following terms:

- Laminar boundary layer
- Turbulent boundary layer
- Laminar sub layer
- Boundary layer thickness.

[10]

OR

9. How will you determine whether a boundary layer flow is attached flow, detached flow or on the verge of separation?

[10]

10. Derive formulae for calculating loss of head due to:

- Sudden enlargement and
- Sudden contraction

[5+5]

OR

11. Explain briefly the following with the help of a neat sketch:

- Hydraulic gradient line (H.G.L)
- Energy gradient line (E.G.L).

[5+5]

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