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VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (Mech. Engg.) II Year I-Semester Backlog Examinations, December-2017

Mechanics of Fluids

Time: **3** hours Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Distinguish between real fluids and ideal fluids.
2. What do you understand by Hydrostatic Law?
3. What are the conditions for flow to be irrotational?
4. Distinguish between Laminar and Turbulent flow.
5. What are the limitations of Bernoulli's equation?
6. Define the terms potential energy and kinetic energy.
7. Explain the term co-efficient of friction. On what factors does this co-efficient depend?
8. What are the characteristics of a turbulent flow?
9. Define boundary layer thickness in terms of Reynolds Number.
10. Define momentum thickness and energy thickness.

Part-B (5 × 10 = 50 Marks)

11. a) Distinguish between manometers and transducers. [4]

    b) The pressure intensity at a point in a fluid is given by 4.9 N/cm^2. Find the corresponding height of fluid when it is (i) water, and (ii) an oil of Specific gravity is 0.8. [6]

12. a) Distinguish between Eulerian and Lagrangian approach to study the fluid flow. [4]

    b) A rectangular pool, 10 m × 25 m, is to be filled to a depth of 3 m. For a filling time of 2 hours, determine the inflow required in m^3/s. If 6 cm hoses are available and the water velocity in each hose is limited 2.5 m/s, determine the number of hoses required. [6]

13. a) Discuss the relative merits and demerits of venturi meter with respect to orifice meter. [4]

    b) An oil of sp.gr. 0.9 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil mercury differential manometer shows a reading of 20 cm. calculate the discharge of oil through the horizontal venturimeter. Take $C_d = 0.98$. [6]

14. a) Derive the Hagen-Poiseuille equation and state the assumptions made. [6]

    b) A pipeline 10 cm diameter conveys glycerin (density 1260 kg/m^3; dynamic viscosity 15 poise) at a velocity of 5 m/s. Make calculations for the maximum shear stress at the pipe wall. [4]

15. a) What is laminar sub layer? How is the concept of laminar sublayer useful? [4]

    b) An aeroplane is flying through air at atmospheric pressure with a velocity of 100 m/s. Assuming that wings can be treated as flat plate with the boundary layer growing from the leading edge of the wing. Calculate the boundary layer thickness at the trailing edge of the wings and total skin friction drag on the wing. The wing is 2 m long with width of 15m. For air $\nu = 1.42 \times 10^{-5}$ m^2/s and $\rho = 1.247$ kg/m^3. [6]

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16. a) Explain the working principle of U-tube manometer with neat sketch? [5]

    b) The velocity components in a steady flow are u = 2kx; v = 2ky; w = -4kz. What is the equation of a streamline passing through the point (1, 0, 1)? [5]

17. Answer any *two* of the following:

    a) Describe about Hot wire anemometer. [5]

    b) Explain the significance of Reynold's number, upper and lower critical values Reynold's number. [5]

    c) Why is it necessary to control the growth of boundary layer on most of the bodies? What methods are used for such a control? [5]