VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD
B.E. (Civil Engg.) II Year II-Semester Advanced Supplementary Examinations, June/July-2017

Fluid Mechanics-I

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. Differentiate between ideal fluids and real fluids.

2. What is the principle involved in pitot tube?

3. Explain the terms path line and streak line.

4. Differentiate between local acceleration and convective acceleration.

5. Write the relation between absolute pressure, gauge pressure and atmospheric pressure.

6. Differentiate between momentum equation and impulse momentum equation.

7. A jet flies at 16kmph through air at a temperature of -8°C. Calculate the Mach number and Mach angle.

8. Differentiate between Isothermal process and adiabatic process.

9. An oil of specific gravity 0.86 flows through a 20cm diameter pipe, and the viscosity of oil is 0.001 Pa-s. If the discharge is 100Lts/sec, compute the type of flow.

10. Write the significance of Moody's diagram.

Part-B *(5 × 10 = 50 Marks)*
(All bits carry equal marks)

11. a) Define Surface tension. Prove that relation between surface tension and pressure inside droplet of liquid in excess of outside pressure is given by p = 4σ/d.

    b) The stream function for a 2-D flow is given by 2 *xy*. Calculate the velocity at the point A (2, 3). Also find the velocity potential function.

12. a) State Bernoulli's theorem for steady flow of an incompressible fluid. Derive an expression for Bernoulli's theorem from first principle and state the assumptions made for such a derivation.

    b) A pipe of 20cm conveying 0.2m³/sec of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressure at the inlet and outlet of the bend are 22.56N/cm² and 21.58 N/cm².

13. a) What is a venturimeter? Derive an expression for the discharge through a venturimeter.

    b) Explain the working of Bourdon pressure gauge with a sketch.

14. a) What do you understand by stagnation pressure? Obtain an expression for stagnation pressure of a compressible fluid in terms of approaching mach number and pressure.

    b) A gas is flowing through a horizontal pipe which is having area of cross-section as 40N/cm² (gauge) and temperature 15⁰C. At another section the area of cross-section is 30N/cm² (gauge). If the mass rate of the flow of gas through the pipe is 0.5 kg/s. Find the velocities of the gas at these sections, assuming an isothermal change. Take R = 29.2 kg-m/kg⁰K, and atmospheric pressure of 10N/cm².

15. a) How will you determine loss of heat due to friction by using Darcy Formula?

b) A smooth pipe of diameter 80mm and 1000m long is carrying water at 8lps. If kinematic viscosity v=0.015 stokes for water and f is given by $f=0.0791/(Re)^{1/4}$, where Re= Reynold's number. Calculate:

   i) Loss of head.   ii) Wall shear stress.   iii) Shear stress at 20mm from the pipe.

16. a) Define flow net and write its significance.

b) What is a notch and where it is used. Also write the advantages of triangular notch over rectangular notch.

17. Write short notes on any **two** of the following:
   a) Current meter
   b) Stagnation pressure
   c) Water hammer.

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