

CBCS SCHEME

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18CH33

Third Semester B.E. Degree Examination, June/July 2023 Momentum Transfer

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the rheological properties of fluids. (10 Marks)
b. State Newton's law of viscosities. Write a note on classification of fluids with examples. (10 Marks)

OR

- 2 a. Define hydrostatic law and derive the barometric equation for compressible fluids. (10 Marks)
b. The atmospheric pressure at sea level is 10.143 N/cm^2 , determine the pressure at a height of 2500 m assuming the pressure variation follows: (i) hydrostatic law (ii) isothermal law. The density of air is given as 1.208 kg/m^3 . (10 Marks)

Module-2

- 3 a. Derive Bernoulli's equation for the flow of incompressible fluids. (14 Marks)
b. Explain man-velocity and discuss continuity equation. (06 Marks)

OR

- 4 a. Derive Hagen Poiseuille's equation for laminar flow in a circular pipe. (12 Marks)
b. Write a note on boundary layer separation and wake formation. (08 Marks)

Module-3

- 5 a. Show that the average velocity is half of maximum velocity in case of laminar flow of Newtonian fluids. (12 Marks)
b. Write a note on frictional losses from changes in velocity or direction. (08 Marks)

OR

- 6 a. Explain friction factor chart. (10 Marks)
b. Discuss the concept of Mach number. Define subsonic, sonic and supersonic flow. (10 Marks)

Module-4

- 7 a. With a neat diagram, explain the construction and working of venturimeter. (10 Marks)
b. With neat sketch, explain the working principle of various types of notches. (10 Marks)

OR

- 8 a. Derive an expression for rate of flow through orifice meter. (12 Marks)
b. With relevant sketch, explain the working principles of pitot tube. (08 Marks)

Module-5

- 9 a. Explain the working of reciprocating pump with neat sketch. (10 Marks)
b. Write a note on fans, compressors and blowers. (10 Marks)

OR

- 10 a. The pressure difference ΔP in a pipe of diameter D and length l due to viscous flow depends on the velocity v , viscosity μ and density ρ . Using Buckingham's π theorem, obtain an expression for ΔP . (12 Marks)
b. Define dimensional homogeneity. Explain the significance of any two dimensionless numbers. (08 Marks)

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