

Time: 3 Hours

Marks: 80

- N. B.:**
- (1) Question No. 1 is compulsory.
  - (2) Attempt any three questions from remaining six questions.
  - (3) Assume suitable data if necessary.

**Q. 1 Answer any Five questions (20)**

- a) What do you mean by the term fluid and give its classification.
- b) State different types of pump used for pumping of fluids.
- c) Write short note on inclined manometer and give its application.
- d) Define and explain Mach number.
- e) Write short note on (1) Reynold's number (2) Continuity equation
- f) What do you understand by the terms: Major losses and minor energy losses in pipes.

**Q. 2.**

- a) Define the term transition length. What is transition length for a straight pipe with turbulent flow. (10)
- b) Write in brief on the characteristics curve of centrifugal pumps. (10)

**Q.3.**

- a) What is a venturimeter? Derive an expression for the discharge through venturimeter (10)
- b) The water is flowing through a pipe having diameter 20 cm and 10 cm at section (1) and (2) respectively. The rate of flow through pipe is 35 litres/s. The section 1 is 6 m above datum line and section 2 is 4 m above datum. If the pressure at section (1) is 39.24 N/cm<sup>2</sup>, Find the intensity of pressure at section (2). (10)

**Q.4.**

- a) State the Bernoulli's theorem for compressible flow. Derive an expression for Bernoulli's equation the process is adiabatic. (10)
- b) What is Hagen Poiseuille's formula? Derive an expression for Hagen Poiseuille's formula. (10)

**Q.5.**

- a) Derive an expression for velocity of sound for an adiabatic process. (10)
- b) A supersonic plane flies at 1900 km/hr in air having a pressure of 28.5 kPa and density of 0.439 kg/m<sup>3</sup>. Calculate the (1) Temperature (2) Pressure and (3) Density of air at the stagnation point on the nose of the plane for adiabatic flow. (Take  $k = 1.4$ ,  $R = 287 \text{ J/kg } ^\circ\text{K}$ ) (10)

**Q.6. Answer any Four questions (20)**

- a) Name the different forces present in a fluid flow for the Euler's equation of motion.
- b) Explain the Rheological behaviour of Newtonian and Non Newtonian fluids?
- c) State and prove Pascal's law.
- d) State various pressure measuring devices.
- e) Write short note on cavitation.

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