

(3 Hours)

Max Marks: 80

- Note:** 1. Question 1 is compulsory.
2. Attempt any 3 out of remaining five questions.
3. Assume any suitable data where ever required.

- Q.1** Attempt any **four**
- Write a Short note on types of fluids. **05**
 - Define Buoyancy and explain Archimede's principle, **05**
 - Explain Pitot tube **05**
 - Write a note on Mach number and its significance **05**
 - Write a note on equipotential lines and flow net **05**
- Q.2**
- Explain types of flow. **05**
 - Define metacentric height and derive experimental method for it. **05**
 - State Bernoulli's Equation Explain each term and state the assumptions of Bernoulli's Equation. **10**
- Q.3**
- Determine different flow pattern with neat and labelled diagram. **05**
 - A 150mm X 75mm venturi meter with coefficient of discharge 0.98 is to be replaced by an orifice meter having a coefficient of discharge 0.6. If both the meter is to give mercury manometer reading for the discharge of 100 litre/sec. and the inlet diameter to remain 150mm, what would be the diameter of orifice. **10**
 - Write a note on Stagnation properties. **05**
- Q.4**
- Given velocity of fluid $V = (6+2xy+t)i - (xy^2+10t)j + 25k$ What is the acceleration of a particle at (3,0,2) at time $t=1$? **10**
 - Explain why a 3m cylindrical body 4.2 m long and weighing 4100kg cannot float in water? **05**
 - Explain propagation of pressure waves in detail. **05**
- Q.5**
- An orifice meter with orifice diameter 10cm is inserted in a pipe line of 20cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter gives the reading of 19.62 N/cm² and 9.81 N/cm² respectively. Take Cd is 0.6. Find the discharge of water through pipe. **10**
 - Determine the velocity of a bullet if the Mach angle is 30°. Given the temperature of the air is 22°C. ($k=1.4$ and $R=287$ J/Kg°K). **10**
- Q.6**
- A 30cmX15cm venturimeter is fitted on a horizontal pipeline discharging oil of specific gravity 0.8. The inlet pressure is 16 N/cm² and throat pressure is -40cm of Hg. If the head lost between inlet and throat is 5% of different pressure head, find discharge through pipe. **10**
 - The velocity vector in a fluid flow is given by, $V = 4x^3i - 10x^2yj + 2tk$. Find the velocity and acceleration of a fluid particle at (2, 1, 3) at time $t = 1$. **10**