

SECTION-B

- 2) Explain Differential manometer with neat sketch.
- 3) Derive continuity equation in Cartesian coordinates.
- 4) Explain Rayleigh's and Buckingham's Pi method for dimensional analysis.
- 5) What is meta centric height? How it is determined?
- 6) What do you mean by Newtonian and non Newtonian fluids?

SECTION-C

- 7) In an experiment a smooth two-dimensional flat plate is exposed to a wind of velocity 90 km/hr. If laminar boundary layer exists up to a value of $R_{nx} = 2 \times 10^5$, find the maximum distance from the leading edge up to which laminar boundary layer exists and its maximum thickness. Take kinematic viscosity of air as $1.6 \times 10^{-5} \text{ m}^2/\text{s}$.
- 8) A pipe 300 meters long has a slope of 1 in 100 and tapers from 1 metre diameter at the higher end to 0.5 metre at the lower end. The quantity of water flowing is 900 liters / second. If the pressure at the higher ends is 70 kPa, find the pressure at the lower end.
- 9) A flat plate $1.5\text{m} \times 1.5 \text{ m}$ moves at 45 km/hour in stationary air of specific weight 11.3N/m^3 . If the coefficients of drag and lift 0.15 and 0.75 respectively find :
 - a) lift force
 - b) drag force
 - c) resultant force
 - d) power required to keep the plate in motion.