

(3 Hours)

[Total Marks : 80]

N.B. (1) Question No 1 is compulsory

(2) Attempt any three questions out of remaining five questions

(3) Assumption made, if any should be clearly stated

(4) Figures to the right indicate full marks.

Q1 Solve any Four out of Five 20

- a) What do you mean by term fluid and give its classification
- b) Write short note on surface tension and capillary effect
- c) Explain NPSHR and NPSHA
- d) Define: 1) Skin Friction 2) Form Friction
- e) A plate 0.025 mm distant from a fixed plate, moves at 60 cm/sec and requires a force of 2 N per unit area i.e., N/m^2 to maintain this speed. Determine the fluid viscosity between the plates.

Q2 10

- a) How are the manometers classified? Explain it in brief. 10
- b) Derive an expression for the discharge through Orifice meter. 10

Q3 10

- a) Explain and derive expression for Pitot tube 10
- b) Derive an expression for Bernoulli's Theorem from Euler's equation of motion. 10

Q4 10

- a) Oil of viscosity 0.098 kg/ (m.s.) and specific gravity 0.9 flows through a horizontal pipe of 2.5 cm diameter. If the pressure drop per meter length of pipe is 0.12 kgf/cm². Determine (i) The rate of flow. (ii) Reynolds number. (iii) The power required per 50 m length pipe to maintain flow. 10
- b) Derive an expression for the velocity distribution, shear stress distribution and relation between average velocity and maximum velocity for the laminar flow of fluid through the circular pipe. 10

Q5 10

- a) Draw and explain the propagation of pressure waves, when $Ma = 1$, $Ma < 1$ and $Ma > 1$ 10
- b) Find the Mach number when an aeroplane is flying at 1100 km/hr through still air having a pressure of 7 N/cm² and temperature -5° C. Wind velocity may be taken as zero. Take $R = 287.14 \text{ J/(kg } ^\circ\text{K)}$. Calculate the pressure, Temperature and density of air at stagnation point on the nose of the plane. Take $k = 1.4$ 10

Q6 10

- a) Explain the characteristics curve of Centrifugal pump. 10
- b) Explain Globe valve and Gate valve with neat sketch. 10