

Code: 9A01304

II B. Tech I Semester (R09) Supplementary Examinations, May 2012

FLUID MECHANICS

(Civil Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain about U tube manometer and explain how the pressure is measured using that instrument.
(b) Find the pressure at a depth of 15 m below the free surface of water in a reservoir.
- 2 (a) What is total pressure?
(b) A trapezoidal plate of top width 6 m, bottom width 5 m and height 3.5 m is immersed vertically in water with its parallel sides parallel to the water level and its top edge is at a depth of 2.5 m below the water level. Find the water thrust on one side of the plate and depth of centre of pressure.
- 3 (a) What is meant by stream line, path line, streak line and stream tube?
(b) What is continuity equation? Explain.
- 4 (a) Define Bernoulli's equation and mention the assumptions made to derive it.
(b) A pipeline carrying oil of specific gravity 0.8, changes in diameter from 300 mm at a position A to 500 mm diameter to a position B which is 5 m at a higher level. If the pressure's at A and B are 19.62 N/c m^2 and 14.91 N/c m^2 respectively, and the discharge is 150 Lit/s, determine the loss of head and direction of flow.
- 5 Water is flowing over a smooth plate having a length of 4 m and a width of 2 m at a velocity of 1 m/s . If boundary layer changes from laminar to turbulent at a Reynold's number 5×10^5 , find the distance from leading edge up to which boundary layer is laminar, the thickness of the boundary layer at the transition point and the drag force on one side of the plate. Take dynamic viscosity of water $= 9.81 \times 10^{-4} \text{ N s/m}^2$.
- 6 Derive Hagen-Poiseuille's equation. Also draw the velocity and shear stress distributions for the same.
- 7 (a) What are the laws of fluid friction for turbulent flow?
(b) A crude oil of kinematic viscosity 0.4 stoke is flowing through pipe of diameter 300 mm at the rate of 300 litres per sec. Find the head lost due to friction for a length of 50 m of the pipe.
- 8 A venturimeter with 200 mm at inlet and 100 mm throat is laid with axis horizontal and is used for measuring the flow of oil of specific gravity 0.8. The difference of levels in the U-tube differential manometer reads 180 mm of mercury and $11.52 \times 10^3 \text{ kg}$ of oil is collected in 4 minutes. Calculate the discharge coefficient for the meter. Take specific gravity of mercury as 13.6.
