CE 214 (R-22)

Total No. of Questions : 10] [Total No.of Pages : 02

II/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2024

First Semester

CIVIL ENGINEERING

FLUID MECHANICS

Time : **Three Hours** Maximum : **70** Marks

Answer ONE Question from each Unit. 5x14=70 M

All Questions carry equal marks.

UNIT - I

1. a) Define the following fluid properties : Density, weight density, specific volume and specific gravity of a fluid.

   b) Define pressure. Obtain an expression for the pressure intensity at a point in a fluid.

(OR)

2. A U-tube mercury manometer is used to measure the pressure of oil flowing through a pipe whose specific gravity is 0.85. The center of the pipe is 15 cm below the level of mercury. The mercury level difference in the manometer is 25 cm, determining the absolute pressure of the oil flowing through the pipe. Atmospheric pressure = 750 mm of Hg.

UNIT - II

3. a) The diameters of a pipe at sections 1 and 2 are 15 cm and 20 cm respectively. Find the discharge through the pipe if the velocity of water at section 1 is 4 m/s. Determine also the velocity in section 2.

   b) Explain the terms : (i) Path line (ii) Streak line (iii) Stream line (iv) Stream tube.

(OR)

4. a) Derive continuity equation for three-dimensional flow.

   b) Distinguish between :

   (i) Rotational and irrigational flow (ii) Laminar and turbulent flow.

UNIT - III

5. a) A pipeline 300 m long has a slope of 1 in 100 and tapers from 1.2 m diameter at the high end to 0.6 m at the low end. The discharge through the pipe is 5.4 m^3/minute. If the pressure at the high end is 70 KPa, find the pressure at the low end. Neglect losses.

P.T.O.

b) A pitot-static tube is used to measure the velocity of water in a pipe. The stagnation pressure head is 6 m and the static pressure head is 5 m. Calculate the velocity of flow assuming the co-efficiency of the tube is equal to 0.98.

(OR)

6. a) An orifice meter with an orifice diameter of 15 cm is inserted in a pipe of 30 cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50 cm of mercury. Find the rate of flow of oil of sp. gr. 0.9 when the co-efficient of discharge of the orifice meter = 0.64.

b) Derive the Euler's equations of motion for three-dimensional steady-state incompressible non-viscous flow.

UNIT - IV

7. a) Discuss the various empirical formulae for discharge over weirs.

b) A horizontal venturi meter with an inlet diameter of 20 cm and throat diameter of 10 cm is used to measure the flow of oil of sp.gr. 0.8. The discharge of oil through the venturi meter is 60 lit/s. Find the reading of the oil-mercury differential manometer. Take Cd = 0.98.

(OR)

8. a) What are the applications of Venturi meter ? Explain the working principle of venturi meter.

b) Find the discharge through a triangular notch under a constant head of 3.25 m if the angle of the notch is 120^{o}. Take Cd = 0.62.

UNIT - V

9. a) Find the head lost due to friction in a pipe of diameter 300 mm and length 50 m, through which water is flowing at a velocity of 3 m/s using the Darcy formula.

b) What are the minor losses in a pipe.

(OR)

10. a) What do you mean by pipe in series and pipes in parallel ?

b) List out the minor losses in closed conduit flow and discuss their significance.