PVP 14

Code: CE3T6

II B.Tech - I Semester–Regular/Supplementary Examinations
November 2016

FLUID MECHANICS
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1.

a) Define viscosity and capillarity.
b) Differentiate between differential manometer and micro manometer.
c) Define stream line and path line.
d) Define stream function and velocity potential function.
e) State Bernoulli's theorem and List out two assumptions.
f) Define laminar boundary layer and turbulent boundary layer.
g) Define pipes in series and pipes in parallel.
h) Define Coutte flow and write equation for flow between parallel plates.
i) Define small orifice and large orifice.
j) Define notch and weir.
k) Define broad crested weir and mention formula to calculate discharge.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2.

a) Classify manometers with a neat sketch. 7 M

b) A plate having an area of 0.6 sq.m is sliding down the inclined plane at 30 degrees to the horizontal with a velocity of 0.36 m/s. There is a cushion of fluid 1.8 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of the plate is 280 N. 9 M

3.

a) List out various flows with examples. 7 M

b) An isosceles triangular plate of base 3 m and altitude 3m is immersed vertically in an oil of specific gravity 0.8. The base of the plate coincides with the free surface of oil. Determine total pressure and centre of pressure. 9 M

4.

a) The water is flowing through a tapering pipe having diameters 300 mm and 150 mm at sections 1 and 2 respectively. The discharge through the pipe is 40 litres/sec. The section 1 is 10 m above datum and section 2 is 6 m above datum. Find the intensity of pressure at section 2 if that at section 1 is 60 kN/m^2.

8 M

b) The vertical component of the landing speed of a parachute is 6 m/s. Treat the Parachute as an open hemisphere and determine its diameter if the total weight to be carried is 1200 N. Take density of air as 1.208 kg/m^3 and coefficient of drag = 1.33. 8 M

5.

a) Oil of specific gravity 0.82 is pumped through a horizontal pipe line 150 mm in diameter and 6 km long at the rate of 0.015 cumecs. The pump has an efficiency of 68% and requires 7.5 kW to pump the oil. What is the dynamic viscosity of the oil and is the flow laminar? 8 M

b) Three pipes of diameters 300 mm, 200 mm and 400 mm and lengths of 450 m, 225 m and 315 m respectively are connected in series. The difference in water surface levels in two tanks is 18 m. Determine the rate of flow of water if coefficients of friction are 0.0075, 0.0078 and 0.0072 respectively considering minor losses and neglecting minor losses. 8 M

6.

a) Determine the rate of flow of water through a pipe 300 mm diameter placed in an inclined position where a venturimeter is inserted having a throat diameter of 150 mm. The difference of pressure between the main and throat is measured by a liquid of specific gravity 0.7 in an inverted U-tube which gives a reading of 260 mm.

The loss of head between the main and throat is 0.3 times the kinetic head of the pipe. 9 M

b) A rectangular channel 1.5 m wide has a discharge of 0.2 cumecs which is measured by a right angled V notch –weir. Find the position of the apex of the notch from the bed of the channel of the maximum depth of water is not to exceed 1 m. Assume coefficient of discharge = 0.62 7 M