

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-IV Semester (CSE/IT/ECE/CE)

COURSE CODE(CREDITS):18B11CE412 (3)

MAX. MARKS: 35

COURSE NAME: FLUID MECHANICS

COURSE INSTRUCTORS: Ashish Kumar

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

1. Explain the following briefly: [CO1] (4)
 - (a) How will you differentiate the laminar flow and turbulent flow in pipe experimentally?
 - (b) What is a Pitot tube? For what purpose it is used?
 - (c) Define the term vena contracta with suitable example.
 - (d) Differentiate between stream line and path line in a flow system.
2. The main water supply has pipe diameter 2.0 m and rate of flow through pipe is 3 cumec. This water supply divides into two parallel pipes which again forms one pipe. The length and diameter of pipes are 2000 m, 1.0 m and 2000 m and 0.8 m respectively. Find the rate of flow in each parallel pipe. Take value of coefficient of friction in pipes $(f) = 0.005$. [CO6] (5)
3. A partially submerged body is towed in water. The resistance R to its motion depends on the density ρ , dynamic viscosity μ of the water, length L of the body, velocity v of the body and the acceleration due to gravity g . Develop the functional relationship between the resistance to motion with other parameters. [CO5] (6)
4. (a) Explain the principle of Orifice meter with neat sketch. [CO4] (2)
(b) An orifice-meter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure between upstream and downstream of the orifice meter measured by differential U tube manometer gives a reading of 60 cm of mercury. Find the rate of flow of water through the pipe. Take $C_d = 0.6$. [CO4] (4)
5. Determine the difference in the elevation between the water surfaces in the two tanks which are connected by a horizontal pipe of diameter 200 mm and length 500 m. The rate of flow of water through the pipe is $0.4 \text{ m}^3/\text{s}$. Consider all the losses and take $f = 0.008$ [CO3] (5)

6. A 30 cm diameter pipe carries water under a head of 15 m with a velocity of 4 m/sec. If the axis of the pipe turns through 45° , find the magnitude and direction of the resultant force at the bend. [CO4] (5)
7. A flat plate of area 1.5 m^2 is pulled with a speed of 0.4 m/sec relative to another plate located at a distance of 0.2 mm from it. Find the force required to maintain this speed, if the fluid separating them is having viscosity as 0.1 Ns/m^2 . [CO1] (4)