

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- APRIL-2023

COURSE CODE(CREDITS): 18B11CE412(3)

MAX. MARKS: 25

COURSE NAME: Fluid Mechanics

COURSE INSTRUCTORS: Ashish Kumar

MAX. TIME: 1 Hour 30 Minutes

*Note: All questions are compulsory. Marks are indicated against each question in square brackets. Notation has its usual meaning. Assume suitable data if required.*

**Q1.** Answer the following in brief. [CO1]

- (a) Differentiate between steady flow and unsteady flow. [1]
- (b) Differentiate between linear deformation and angular deformation. [1]
- (c) Define the term vena contracta in orificemeter. [1]
- (d) Differentiate between U tube manometer and U tube differential manometer. [1]

**Q2. (a)** Explain the principle of Venturimeter. For what purpose it is used? [CO 4] [2]

- (b) oil is flowing through a pipe of diameter of 30 cm. A venturimeter with throat diameter 15 cm and inlet diameter 30 cm diameter was used for measuring its flow rate. The pressure difference measured by a mercury manometer fitted on the two sides of the venturimeter gives a reading of 50 cm of mercury. Find the rate of flow of oil of specific gravity 0.9 when the co-efficient of discharge of the meter = 0.98. [CO 4, CO 6] [4]

**Q3.** A hydraulic press has a ram of 30 cm diameter and plunger of 4.5 cm diameter. Find the weight lifted by the hydraulic press when the force applied at the plunger is 500 N. [CO2] [3]

**Q4. (a)** Show that if velocity potential function exists, the flow should be irrotational. [CO1] [2]

- (b) If for a two dimensional flow, the velocity potential function is given by  $\Phi=4x(3y-4)$ , Determine the velocity at the point  $x(2,3)$ . Determine also the value of stream function at the point  $x$ . [CO1] [4]

**Q5. (a)** Explain Bernoulli's theorem for ideal condition. What are the conditions in real life where Bernoulli's theorem is not valid? [CO3] [1+1]

- (b) A pipe line 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 pressures at A and B are 19.62 N/cm<sup>2</sup> and 14.91 N/cm<sup>2</sup> respectively, and the discharge is 0.15m<sup>3</sup>/s, determine the loss of head and direction of flow. [CO3] [4]