Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

Term Evaluation (Odd) Semester Examination September 2025

Roll no.....

Name of the Course: B.Tech (Civil Engineering)
Semester: III
Name of the Paper: *Fluid Mechanics*
Paper Code: TCE 301
Time: 1.5 hour **Maximum Marks: 50**

Note:
(i) Answer all the questions by choosing any one of the sub-questions
(ii) Each question carries 10 marks.

Q 1. 10 Marks

a) With the help of a neat diagram define the term; Absolute pressure, Gauge pressure and vacuum pressure. What is the relation between Absolute pressure and Gauge pressure? **CO 1**

(OR)

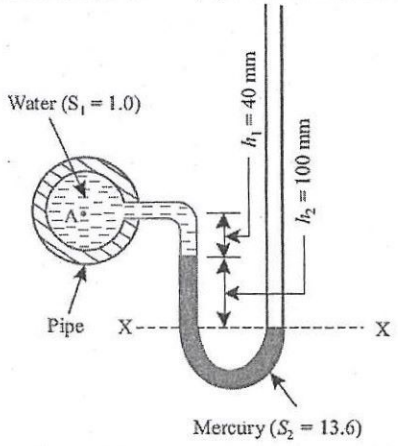
b) Calculate the dynamic viscosity of oil, which is used for lubrication between a square plate of size 0.8m x0.8mand an inclined plane with angle of inclination 30^0. The weight of the square plate is 300N and it slides down the inclined plane with a uniform velocity of 0.3 m/s. The thickness of oil film is 1.50 mm. **CO 1**

Q 2. 10 Marks

a) State and prove Pascal's law. **CO 1**

(OR)

b) U-tube manometer containing mercury was used to find the negative pressure in the pipe, containing water. The right limb was open to the atmosphere. Find the vacuum pressure in the pipe, if the difference of mercury level in the two limbs was 100 mm and height of water in the left limb from the centre of the pipe was found to be 40 mm below. **CO 1**



Q 3. 10 Marks

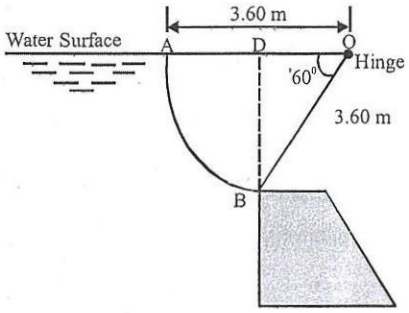
a) Define Metacentre and Metacentric height. How are they important in case of floating body? **CO 2**

(OR)

b) A 60^0 sector gate of 3.60 m radius is mounted on the spillway of a dam as shown in figure. Its hinge and one of its end radial arms are at the same horizontal level as the water surface. What is the magnitude and direction of the resultant pressure on the gate, if the length of the gate is 3.0 m? **CO 1**

Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

Term Evaluation (Odd) Semester Examination September 2025



Q 4. 10 Marks

a) Differentiate between Stream function and velocity potential function. **CO 2**

(OR)

b) If the velocity component for two dimensional flow are given by $u = \frac{x}{x^2 + y^2}$ and $v = \frac{y}{x^2 + y^2}$; determine the acceleration components a_x and a_y. **CO 2**

Q 5. 10 Marks

a) Explain the terms: Path Line, Stream Line, Streak Line and Stream Tube. **CO 2**

(OR)

b) A pipe through which water is flowing, is having diameters 20 cm and 10 cm at the cross – sections 1 and 2 respectively. The velocity of water at section 1 is given 4 m/s. Find the velocity head at sections 1 and 2 and also the rate of flow. **CO 2**