

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-III Semester (CE)

COURSE CODE (CREDITS): 23B11CE315 (3)

MAX. MARKS: 35

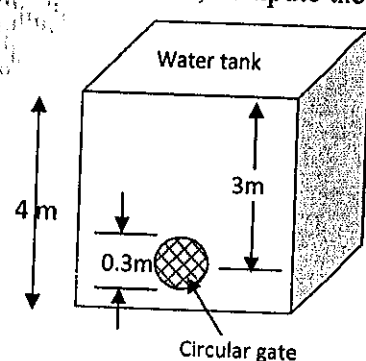
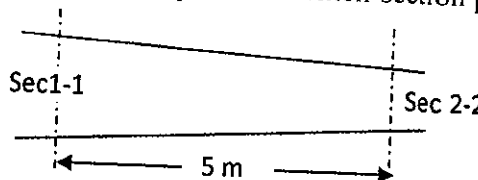
COURSE NAME: Fluid Mechanics

COURSE INSTRUCTORS: Ashish Kumar

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

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

Q.No	Question	CO	Marks
Q1(a)	Differentiate between ideal fluids and real fluid with suitable example.	CO1	1
Q1(b)	Differentiate between steady flow and unsteady flow in a fluid system.	CO3	1
Q1(c)	A fluid particle is rotating in x-y plane about z axis. What are the conditions for flow to be rotational.	CO3	1
Q1(d)	The total drag force working on an object has two components; pressure drag and friction drag. Consider a thin flat plate immersed in the fluid and find the components of force applicable on it if plate is parallel to the direction of flow.	CO6	1
Q2	<p>A cubical water storage tank having side 4 m is full of water. A circular gate having diameter 0.3 m is fitted on one of the vertical walls to release water. If centre of circular gate is 3 m from the water surface, compute the pressure on the gate and also centre of pressure.</p> 	CO2	4
Q3	<p>A circular pipe has a varying diameter from 30 cm at section 1-1 to 20 cm at section 2-2. If the centreline of pipe is in horizontal plane, find the difference of head between two section. Take discharge through the pipe as $0.04 \text{ m}^3/\text{s}$. Neglect the energy loss in the pipe. In your opinion at which section pressure will be more and why?</p> 	CO4	4

Q4	An orifice meter with orifice diameter 20 cm is inserted in a pipe of 40 cm diameter. The pressure difference measured by a mercury manometer fitted on the two sides of the orifice meter gives a reading of 50 cm of mercury. Find the rate of flow of water through the pipe if co-efficient of discharge of the meter = 0.6.	CO4	5
Q5	The difference in water surface levels in two tanks, which are connected by three pipes in series of length 300 m, 170m and 210 m and of diameters 300 mm, 200 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if coefficient of friction is 0.005. Neglect minor losses.	CO4	6
Q6	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 . Derive the functional relationship for resistance (R) using pie Buckingham theorem.	CO5	7
Q7	A Flat plate having size 1.5 m X 1.5 m moves at 15 m/s in stationary air of density 1.15 kg/m^3 . If the co-efficient of drag and lift are 0.25 and 0.75 respectively, determine: lift force, Drag force , Resultant force, and the power required to keep the plate in motion.	CO6	5