QP Code: RA23BTECH127 | Reg. No | | | | | | | | | | | AY 23

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

B. Tech (Fourth Semester - Regular) Examinations, April – 2025

23BCVPC24003–Fluid Mechanics

(Civil Engineering)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	Write the relation between absolute, gauge, and atmospheric pressure.	CO1	K1
b.	Explain stable and unstable equilibrium of floating bodies.	CO2	K2
c.	What is Pitot tube and its application?	CO3	K1
d.	What is major head loss?	CO4	K1
e.	Define hydraulic jump.	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions		Marks	CO #	Blooms Level
2. a.	Define viscosity and explain Newton's law of viscosity with an example.	5	CO1	K2
b.	A body of weight 500N having surface area of 0.2 m^2 slides down a lubricated inclined plane making an angle 300 with the horizontal. The oil has viscosity of 10 poise and a body speed of 1 m/s, determine the film thickness of the oil required.	5	CO1	K3
	(OR)			
c.	Calculate the capillary rise in a glass tube of 3mm diameter when immersed in water at 20^0 C. Take surface tension of water at 20^0 C as 0.0075 kg/m. What will be the percentage increase in the value of capillary rise if the diameter of the glass tube is 2 mm?	5	CO1	K3
d.	A U-tube manometer contains water and mercury. One limb is connected to a pipe containing water under pressure, and the other limb is open to the atmosphere. If the mercury column shows a difference of 100 mm, calculate the pressure in the pipe.	5	CO1	K3
3.a.	Calculate the height of centre of pressure for an inclined rectangular plate.	5	CO2	K3
b.	A rectangular plate of 3m × 2m is submerged vertically in water such that its top edge is 2 m below the water surface. Calculate total pressure and centre of pressure.	5	CO2	K4
	(OR)			
c.	Discuss the method of determining metacentric height experimentally.	5	CO2	K4
d.	Compare stability of submerged and floating bodies.	5	CO2	K2
4.a.	What are the practical applications of Bernoulli's equation? Explain it?	5	CO3	K2
b.	A Venturi meter of throat diameter 5 cm is fitted into a 12.5 cm diameter water pipe line. The coefficient of discharge is 0.96. Calculate the flow in the pipe line	5	CO3	K3

	when the reading on a mercury water differential U tube manometer connected to the upstream and throat sections shows a reading of 20 cm.			
	(OR)			
c.	Water flows through a horizontal pipe with a diameter reducing from 200 mm to 100 mm. The pressure at the larger section is 100 kPa, and the velocity is 3 m/s. Assuming no energy loss, find the pressure at the smaller section using Bernoulli's equation.	5	CO3	K3
d.	A horizontal Venturi meter is fitted in a pipe carrying water. The inlet and throat diameters are 200 mm and 100 mm respectively. The differential manometer connected between inlet and throat shows a reading of 200 mm of mercury. Calculate the discharge through the pipe. Take $C_d = 0.98$	5	CO3	K3
5.a.	Explain how the following flow problems are analyzed. i) Series pipe connection (ii) parallel pipe connection iii) Equivalent pipe connection.	5	CO4	K4
b.	A pipe of diameter 400 mm carries water at a velocity of 25 m/s. the pressures at the points A and B are given as 29.43 N/cm^2 and 22.563 N/cm^2 respectively while the datum head at A and B are 28 m and 30 m. Find the loss of head between A and B.	5	CO4	K3
	(OR)			
c.	Explain about Reynolds experiment with neat sketch.	5	CO4	K2
d.	Discuss velocity, contraction and discharge coefficients for orifices.	5	CO4	K2
6.a.	Explain how open channel flow measurement techniques differ from closed conduit methods. Highlight the devices used for field applications.	5	CO5	K2
b.	Discuss the importance of critical, sub-critical, and super-critical flows. How are these identified in practice and what is their significance in design?	5	CO5	K2
	(OR)			
c.	Explain the significance of hydraulic jump in open channel flow. Derive an expression for sequent depth.	5	CO5	K2
d.	What is meant by most economical channel section? Derive conditions for most economical section for both rectangular and trapezoidal open channels.	5	CO5	K3

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