

Hall Ticket Number:

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Code No. : 14147

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (Civil Engg.) IV-Semester Main Examinations, July-2022

Fluid Mechanics

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1. ✓	Write the relation among atmospheric pressure, absolute pressure, and gage pressure.	2	2	1	2
2. ✓	Define Pascal law.	2	1	1	1
3. ✓	Define convective and local acceleration.	2	2	2	1
4. ✓	What is the importance of a metacenter for a floating body?	2	3	2	4
5. ✓	Differentiate between forced vortex flow and free vortex flow.	2	2	3	2
6. ✓	Draw TEL, HGL for a fluid flowing through a venturimeter.	2	2	3	3
7. ✓	What is the significance of upper and lower critical Reynold's number	2	2	4	1
8. ✓	Draw shear stress and velocity distribution for a laminar flow through a pipe.	2	2	4	2
9. ✓	Define bluff body.	2	1	5	1
10. ✓	What causes a boundary layer to develop?	2	1	5	4
Part-B (5 × 8 = 40 Marks)					
11. a)	Derive the equation for total pressure and center of pressure on a vertical plane surface immersed in a liquid.	4	3	1	2
b)	A rectangular plate of 50cm X 50 cm dimensions and weighing 500N slides down an inclined plane making 30° with horizontal. The velocity of the plate is 1.75 m/s. If the 2 mm gap between the plate and the inclined surface is filled with lubricating oil, find the viscosity of the oil and express in units of poise.	4	4	1	4
12. a)	Derive continuity equation for an incompressible fluid for a three dimensional flow.	4	2	2	3
b)	A-2D steady flow is given by the stream function $\psi = 2xy$. Determine the velocity at a point P (1,4) in the field. Find out the value of velocity potential function passing through the point 'P'.	4	4	2	1
13. a)	Derive Bernoulli's energy equation through integration of Euler's equations of motion.	4	2	3	3
b)	A 30cm x 15cm venturimeter is inserted in vertical pipe carrying water flowing in the upward direction. A differential manometer connected to the inlet and throat gives a reading of 30 cm. Take $c_d = 0.98$, find the discharge.	4	4	3	1

14 a)	Derive the expression for loss of head due to friction in turbulent flow through circular pipes.	4	3	4	2
b)	A pipe of 5 cm diameter is carrying an oil of kinematic viscosity 0.8 stokes. If the Reynold's number of the flow is 1800, find the velocity at radius 0.6 cm from the wall.	4	4	4	1
15. a)	Define Drag and lift, explain the principles of stream lining with neat diagrams.	4	2	5	4
b)	Explain fundamental causes of boundary layer existence. Discuss the various methods of controlling the boundary layer.	4	3	5	4
16. a)	Differentiate between mechanical gauges and manometers.	4	2	1	1
b)	What are the different types of flows? Explain with a examples.	4	2	2	2
17.	Answer any <i>two</i> of the following:				
a)	Derive the force exerted by a jet of water on a stationary vertical plate in the direction of jet.	4	3	3	3
b)	What are minor losses? Discuss in detail different types of minor losses encountered in pipe flow.	4	3	4	4
c)	Explain Magnus effect with a neat diagram.	4	2	5	2

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%
