

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Regular/Supplementary Winter Examination – 2024

Course: Second Year B. Tech (Sem-III) Branch : Civil Engineering Semester :III

Subject Code & Name: BTCVC304 Hydraulics-I

Max Marks: 60 Date: 12/02/2025 Duration: 3 Hr.

Instructions to the Students:

1. Each question carries 12 marks.
2. Question No. 1 will be compulsory and include objective-type questions.
3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6.
4. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
5. Use of non-programmable scientific calculators is allowed.
6. Assume suitable data wherever necessary and mention it clearly.

		(Level/CO)	Marks
Q. 1	Objective type questions. (Compulsory Question)		12
1	Which property of a fluid is defined as mass per unit volume?	BL2/CO 2	1
	a) Specific gravity b) Density c) Specific weight d) Compressibility		
2	The phenomenon of a liquid rising in a narrow tube due to surface tension is called	BL2/CO 2	1
	a) Capillarity b) Adhesion c) Cohesion d) Buoyancy		
3	Which fluid property is responsible for spherical shape of droplets?	BL2/CO 2	1
	a) Viscosity b) Compressibility c) Surface tension d) Density		
4	The buoyant force acts through which point on a submerged object?	BL2/CO 2	1
	a) Center of gravity b) Center of buoyancy c) Metacenter d) Any point on the surface		
5	Which of the following is not a type of fluid flow?	BL2/CO 2	1
	a) Steady flow b) Rotational flow c) Linear flow d) Laminar flow		
6	The continuity equation is derived from the law of	BL2/CO 2	1
	a) Conservation of energy b) Conservation of mass c) Conservation of momentum d) Conservation of velocity		
7	In fully developed laminar flow in a pipe, the velocity profile is	BL2/CO 3	1
	a) Linear b) Uniform c) Parabolic d) Exponential		
8	Which of the following is a method of dimensional analysis?	BL2/CO 2	1
	a) Rayleigh's method b) Froude's method c) Euler's method d) Bernoulli's method		
9	The Bernoulli equation is applicable to	BL2/CO 3	1
	a) Compressible and viscous flow b) Steady and inviscid flow c) Steady and compressible flow d) Viscous and turbulent flow		
10	The primary function of a Pitot tube is to measure	BL2/CO 2	1
	a) Pressure difference b) Flow velocity c) Fluid density d) Fluid viscosity		
11	Which of these fluids is an example of a Newtonian fluid?	BL2/CO 2	1

	a) Blood	b) Paint	c) Water	d) Toothpaste		
12	What is the unit of surface tension in the SI system?				BL2/CO2	1
	a) N/m ²	b) N/m	c) Pa	d) kg/m		
Q. 2	Solve the following.					12
A)	Define the term i) Surface tension ii) Viscosity iii) Density or mass density				BL2/CO 2	6
B)	Describe the capillarity phenomenon and derive the equation for the height of capillary rise.				BL2/CO2	6
Q.3	Solve the following.					12
A)	The right limb of a simple U – tube manometer containing mercury is open to the atmosphere, while the left limb is connected to a pipe in which a fluid of sp.gr.0.9 is flowing. The centre of pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe, if the difference of mercury level in the two limbs is 20 cm.				BL3/CO1	6
B)	Derive an expression for the force exerted on a submerged inclined plane in the liquid.				BL3/CO2	6
Q. 4	Solve Any Two of the following.					12
A)	Derive Bernoulli's equation for the flow.				BL3/CO2	6
B)	What is a Venturimeter? Derive an expression for the discharge through Venturimeter.				BL2/CO1	6
C)	A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and throat is 20 cm of mercury. Determine the rate of flow. Take Cd=0.98				BL4/CO3	6
Q.5	Solve Any Two of the following.					12
A)	Derive the velocity profile for fully developed laminar flow between two stationary parallel plates.				BL2/CO3	6
B)	Find the head lost due to friction in a pipe of diameter 300 mm and length 50 m, through which water is flowing at a velocity of 3m/s using i) Darcy formula ii) Chezy's formula for which C = 60.				BL3/CO3	6
C)	Derive an expression for the loss of head due to sudden enlargement of pipe.				BL3/CO3	6
Q. 6	Solve Any Two of the following.					12
A)	What are the methods of dimensional analysis? Explain in detail Rayleighs method.				BL2/CO3	6
B)	Explain with neat sketch concept of boundary layer.				BL3/CO4	6
C)	Explain the difference between distorted and undistorted models with examples.				BL4/CO4	6
*** End ***						