

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - III EXAMINATION - WINTER 2025

Subject Code: BE03013021

Date: 17-12-2025

Subject Name: Basics of Environmental Hydraulics

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

	Marks
Q.1 (a) State Bernoulli's theorem and write down the assumptions for it.	03
(b) Explain the term viscosity and differentiate between Kinematic viscosity and Dynamic viscosity.	04
(c) Define fluids and explain different types of fluid with figure.	07
Q.2 (a) Define & Explain (i) Capillary Effect (ii) Specific Gravity (iii) Mass density	03
(b) Distinguish between: (1) Rotational and Irrotational flow (2) Uniform and Non-uniform flow	04
(c) State and explain the pascal's law with its applications.	07
OR	
(c) Derive expressions for total force and centre of pressure on a vertical plane surface submerged in static liquid.	07
Q.3 (a) Draw simple sketch and explain working of piezometer.	03
(b) A U-tube manometer contains the mercury as monomeric liquid. One end of manometer is connected to a pipe in which a fluid of specific gravity 0.8. The level of mercury in right limb is 7 cm above the centre of pipe. Calculate pressure of fluid in a pipe when the difference of mercury level in two limbs is 17 cm.	04
(c) Derive an expression for Euler's equation of motion.	07
OR	
(a) Give classification of manometer.	03
(b) A pipe is having diameters, 30 cm and 15 cm at the cross sections 1 and 2 respectively, through which water is flowing. The velocity of water at section-1 is given as 6 m/s. determine the velocity head at section-1 and 2 and also flow rate.	04
(c) Derive an expression for equation of continuity in a 3D flow in Cartesian co-ordinates system.	07
Q.4 (a) Classify the various energy (Major & Minor) losses in pipe.	03
(b) Write a short note on the hydraulic co-efficients.	04

- (c) Derive a Darcy Weisbach equation for Head Loss due to friction in pipe and also derive Chezy's formula from that. 07

OR

- (a) Define EGL and HGL. 03

- (b) Calculate the discharge through a pipe of diameter 250 mm when the difference of pressure head between the two ends of pipe 500 m apart is 3.5 m of water. Take value of friction factor is 0.04. 04

- (c) Derive an expression for rate of flow through Venturimeter. 07

- Q.5** (a) Define orifice and mouthpiece and explain the term vena contracta. 03

- (b) Differentiate between Notch & Weir. 04

- (c) Derive an expression for discharge through triangular notch. 07

OR

- (a) Give classification of orifices and mouthpieces. 03

- (b) Differentiate between open channel flow and pipe flow. 04

- (c) Derive an expression for most efficient and economical cross section for rectangular cross section. 07
