

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2024****Subject Code:2160602****Date:17-05-2024****Subject Name:Applied Fluid Mechanics****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) Derive continuity equation for one dimensional flow.	03
(b) Explain briefly followings: (1) Uniform and non-uniform flow (2) Subcritical and supercritical flow	04
(c) What is priming? Discuss various components of centrifugal pump.	07
Q.2 (a) Define hydraulic jump and give its applications.	03
(b) Describe laminar sub layer and laminar boundary layer.	04
(c) Derive formulae for calculating head loss due to sudden enlargement in pipe flow.	07
OR	
(c) A trapezoidal channel has been laid at a longitudinal slope of 1 in 1750 and side slope of 1.5:1 (H:V). Calculate bed width and depth of flow, if it carries a discharge of 120 cumecs with depth of flow is 0.75 time width. Take Manning's coefficient as 0.015.	07
Q.3 (a) Explain briefly hydraulic gradient line and total energy line.	03
(b) Describe rapidly varied flow and gradually varied flow with example.	04
(c) The velocity distribution in the boundary layer is given by, $\frac{u}{U} = \frac{3y}{2\delta} - \frac{1}{2} \frac{y^2}{\delta^2}$	07
Where δ is boundary layer thickness. Calculate (1) Ratio of displacement thickness to boundary layer thickness and (2) Ratio of momentum thickness to boundary layer thickness.	
OR	
Q.3 (a) What is draft tube? State purpose of providing draft tube.	03
(b) Write a short note on equivalent pipe.	04
(c) Discuss specific energy curve with its applications.	07
Q.4 (a) Explain Reynold's experiment used to demonstrate laminar and turbulent flow.	03
(b) Discuss effect of pressure gradient on boundary layer separation.	04
(c) Prove that the velocity distribution across a pipe section is parabolic and average velocity is half of maximum velocity for laminar flow through circular pipe.	07

OR

- Q.4** (a) Define: Unit speed, Unit discharge and Unit power. **03**
(b) Write short note on dimensionless numbers. **04**
(c) Discuss 'Prandtl mixing length theory'. **07**

- Q.5** (a) Explain geometrical and dynamic similarities.. **03**
(b) What is water hammer? Derive an expression for rise of pressure when water flowing through pipe is brought to rest by closing of valve gradually. **04**
(c) Derive dynamic equation of gradually varied flow with assumptions. **07**

OR

- Q.5** (a) Explain different types of efficiencies of hydraulic turbines. **03**
(b) Explain effects of cavitation and precautions against cavitation. **04**
(c) State Buckingham's π theorem. Describe Buckingham's π theorem for dimension analysis. How repeating variable selected for π theorem. **07**
