

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI EXAMINATION – SUMMER 2025

Subject Code:2160602

Date:22-05-2025

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) Write the differences between pipe flow and open channel flow? **03**
- (b) Explain the terms:(1) Hydraulic gradient line (2) Total energy line. **04**
- (c) Determine the loss of head due to friction in pipes by using (1) Darcy-Weisbach Formula and (2) Chezy's Formula. **07**
- Q.2**
- (a) Explain the term dimensional homogeneity with an example. **03**
- (b) Explain Buckingham's π -theorem in dimensional analysis. **04**
- (c) Derive an expression for loss of head due to sudden enlargement of a pipe. **07**

OR

- (c) Explain water hammer in pipes. Derive an expression for the rise of pressure when the flowing water in a pipe is brought to rest by closing the valve gradually. **07**
- Q.3**
- (a) Define:Hydraulic mean depth, Afflux and Back water curve. **03**
- (b) Differentiate between:(1) Uniform flow and non-uniform flow (2) Steady and unsteady flow **04**
- (c) Explain boundary layer separation. Also discuss the effect of pressure gradient on boundary layer separation. **07**

OR

- Q.3**
- (a) Define: Critical, sub-critical and super-critical flow in an open channel. **03**
- (b) Differentiate between:(1) Laminar flow and turbulent flow (2) Rapidly varied flow and gradually varied flow **04**
- (c) Explain displacement thickness. Derive an expression for the displacement thickness. **07**
- Q.4**
- (a) Explain various types of open channels with sketches. **03**

(b) Derive the condition for maximum discharge for a given value of specific energy. **04**

(c) Define the term most economical channel section? Derive the conditions for the most economical trapezoidal channel section. **07**

OR

Q.4 (a) Write down the assumptions made for deriving an equation for gradually varied flow. **03**

(b) Define hydraulic jump? Derive an expression for depth of hydraulic jump in terms of upstream Froude number. **04**

(c) Draw a specific energy curve. Derive expression for critical depth and critical velocity. **07**

Q.5 (a) Define specific speed, unit discharge and unit power of turbine **03**

(b) Give classification of hydraulic turbine, **04**

(c) Explain construction and working of a centrifugal pump.. **07**

OR

Q.5 (a) What is priming? Why is it necessary? **03**

(b) Differentiate between (1) Impulse and Reaction turbines (2)Kaplan and propeller turbines. **04**

(c) Explain construction and working of a Pelton wheel. **07**
