Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021

Subject Code:2160602 Date:26/11/2021

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.**

Q.1	**(a)**	What is open channel? Why bed slope is provided in open channel?	**03**
	(b)	Explain various types of open channels with sketch	**04**
	(c)	What do you mean by most economical channel section? Derive the condition for trapezoidal channel of best section.	**07**
Q.2	**(a)**	Explain the terms: Hydraulic gradient line and Total energy line.	**03**
	(b)	Derive an expression for the loss of head due to sudden enlargement of a pipe.	**04**
	(c)	Prove that the velocity distribution for viscous flow between two parallel plates when both plates are fixed across a section is parabolic in nature.	**07**
		OR	
	(c)	Obtain the Hagen-Poiseuille equation for viscous flow through a circular pipe.	**07**
Q.3	**(a)**	Define and enlist types of draft tube with neat sketch.	**03**
	(b)	What do you mean by pipes in series and pipes in parallel? How the loss of head is determined in both systems.	**04**
	(c)	Explain boundary layer growth over a flat plate. Derive the expression for momentum thickness of boundary layer flow.	**07**
		OR	
Q.3	**(a)**	Explain the various types of similarities exist between model and its prototype.	**03**
	(b)	Explain Buckingham method of dimensional analysis.	**04**
	(c)	The pressure difference Δp in a pipe of diameter D and length l due to turbulent flow depends on the velocity V, viscosity μ, density ρ and roughness k. Using Buckingham's π-theorem, obtain an expression for Δp.	**07**
Q.4	**(a)**	Differentiate between Impulse and Reaction turbine.	**03**
	(b)	A Pelton wheel is having a mean bucket diameter of 1m and is running of 1000 r.p.m. The net head on the Pelton wheel is 650 m. If the side clearance angle is 15° and discharge through nozzle is 0.1 m3/s, find (i) Power available at the nozzl, and (ii) Hydraulic efficiency of the turbine.	**04**
	(c)	What is dimensional less number? State and explain them.	**07**
		OR	
Q.4	**(a)**	Differentiate between a pump and the turbine.	**03**
	(b)	Explain separation of boundary layer.	**04**
	(c)	Explain the principal and working of a centrifugal pump with a neat sketch.	**07**
Q.5	**(a)**	What is specific energy head? Draw specific energy diagram.	**03**
	(b)	Explain under what condition hydraulic jump can occur.	**04**
	(c)	Derive the non uniform flow equation and explain back water curve and draw down curve.	**07**

OR

Q.5	**(a)**	Explain the efficiencies of turbine.	**03**
	(b)	Draw a layout of hydroelectric plant and explain different components of hydroelectric plant.	**04**
	(c)	Explain Froude model law. Obtain scale ratio for time, acceleration and discharge for the Froude model law.	**07**

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