Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2020

Subject Code:2160602 **Date:22/01/2021**

Subject Name:Applied Fluid Mechanics

Time:02:00 PM TO 04:00 PM **Total Marks: 56**

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Explain the terms: Pipes in parallel, Pipes in series and Equivalent pipe.	**03**
	(b)	Write the differences between pipe flow and open channel flow.	**04**
	(c)	Derive Darcy Weisbach formula for the loss of head due to friction in pipe line.	**07**
Q.2	**(a)**	Define the most economical channel section. Derive the condition for rectangular channel of best section	**03**
	(b)	Derive Chezy's formula to calculate the velocity in case of a channel.	**04**
	(c)	Three pipes have been connected between the points A and B. Total discharge between A and B is 200 lt/sec. Physical characteristics of the pipes are, $f_1 = f_2 = f_3 = 0.02$ $L_1 = L_2 = L_3 = 1000$ m $D_1 = 0.10$ m, $D_2 = 0.20$ m, $D_3 = 0.30$ m Calculate the discharges of each pipe and calculate the head loss between the points A and B. Draw the energy line of the system.	**07**
Q.3	**(a)**	Enlist the important applications of Navier-stoke equations	**03**
	(b)	Discuss the phenomenon of boundary layer separation	**04**
	(c)	Explain with diagram the Specific Energy Curve and Discharge Curve and derive the mathematical expression for minimum specific energy and maximum discharge in terms of depth of flow	**07**
Q.4	**(a)**	Differentiate between: (1) uniform flow and non-uniform flow (2) laminar flow and turbulent flow	**03**
	(b)	Show that for trapezoidal channel of most economical section (1) half of top width = length of one of the slopping side (2) hydraulic mean depth = ½ depth of flow.	**04**

	(c)	What is displacement Thickness? Derive the expression for displacement thickness of boundary layer flow	**07**
Q.5	**(a)**	Explain Froude model law	**03**
	(b)	Compare Impulse turbine and Reaction Turbine.	**04**
	(c)	What is afflux? Derive the expression for length of Back water curve.	**07**
Q.6	**(a)**	Explain various types of open channels with sketch	**03**
	(b)	What is cavitation? What are its effects? Give necessary precaution against cavitations in pumps.	**04**
	(c)	Draw a general layout of a Hydroelectric power plant using an impulse turbine and define the following: 1) Gross Head 2) Net Head 3) Hydraulic Efficiency 4) Overall Efficiency of Impulse turbine	**07**
Q.7	**(a)**	Define: Inertia force, Viscous force and Gravity force.	**03**
	(b)	Explain the efficiencies of turbine.	**04**
	(c)	Explain the Buckingham's π- theorem for dimensional analysis.	**07**
Q.8	**(a)**	What are distorted and undistorted models? What are the advantages of using distorted model?	**03**
	(b)	Explain the working of a pelton wheel	**04**
	(c)	Explain the term hydraulic jump. Derive an expression for the depth of hydraulic jump in terms of the upstream Froude number.	**07**

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