

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, $f_1 = f_2 = f_3 = 0.02$ $L_1 = L_2 = L_3 = 1000 \text{ m}$ $D_1 = 0.10 \text{ m}, D_2 = 0.20 \text{ m}, D_3 = 0.30 \text{ m}$ 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 = $\frac{1}{2}$ 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
