GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2021

Subject Code:2160602   **Date:04/08/2021**
Subject Name:Applied Fluid Mechanics
Time:02:30 PM TO 05:00 PM   **Total Marks: 70**

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Define: Super critical flow, Total Energy line, Couette flow.	**03**
	(b)	Derive an expression for the loss of head due to friction in pipe.	**04**
	(c)	What does it understood by a channel of 'most economical section'? Prove that the hydraulic mean depth for a most economical trapezoidal channel is equal to one half of depth of flow.	**07**
Q.2	**(a)**	Define : Dimensional homogeneity, Average Co-efficient of Drag, Draft-tube.	**03**
	(b)	Discuss the phenomenon of boundary layer separation.	**04**
	(c)	A 8 m wide channel conveys 15 m^3/s of water at a depth of 1.2 m. Calculate: (i) Specific energy of the flowing water; (ii) Critical depth, critical velocity and minimum specific energy; (iii) Froude number and state whether flow is subcritical or supercritical.	**07**

OR

	(c)	A main pipe divides into two parallel pipes which again forms one pipe. The flow rate in the pipe is 5 m^3/s. The length and diameter of first parallel pipe are 1000 m. and 1.5 m. respectively while length and diameter of second parallel pipe are 1000 m. and 1 m. respectively. The co-efficient of friction for each parallel pipe is same and equal to 0.0055. Calculate flow rate in each parallel pipe.	**07**
Q.3	**(a)**	Explain hydraulically smooth and rough pipes	**03**
	(b)	Write the differences between pipe flow and open channel flow?	**04**
	(c)	A trapezoidal channel having the side slope equal to 60° with the horizontal and laid on a slope of 1 in 850, carries a discharge of 30 m^3/s. Find the width at the base and depth of flow for most economical section. Take the value of Chezy's co-efficient C = 66.	**07**

OR

Q.3	**(a)**	Define: laminar sub-layer, displacement thickness, boundary layer.	**03**
	(b)	Explain the Buckingham's π-theorem.	**04**
	(c)	Derive the expression for the length of back water curve.	**07**

Q.4	(a)	Define : Hydraulic Jump, Afflux, Hydraulic gradient line	03
	(b)	Explain the terms Distorted and Undistorted Models. What are the advantages and disadvantages of Distorted models?	04
	(c)	What do you mean by pipes in series and pipes in parallel? How the loss of head is determined in both systems	07

OR

Q.4	(a)	Write a short note on Water hammer phenomenon.	03
	(b)	Classify the various types of channel and explain any one classification.	04
	(c)	By use of method of dimensional analysis obtain the expression for critical depth y_c in a triangular channel. The critical depth depends upon discharge 'Q', acceleration due to gravity 'g' and angle of the channel 'θ'.	07

Q.5	(a)	Differentiate between a pump and the turbine.	03
	(b)	Draw a layout of hydroelectric plant and explain different components of hydroelectric plant.	04
	(c)	Classify the different types of turbine and describe all in brief.	07

OR

Q.5	(a)	Explain the efficiencies of turbine.	03
	(b)	Describe component part of centrifugal pump and explain priming.	04
	(c)	Explain performance characteristic curves for turbines with help of sketches.	07

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