GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2018

Subject Code:2160602   **Date:20/11/2018**

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.

Q.1	**(a)**	Explain various types of open channels with sketch	**03**
	(b)	Write the differences between pipe flow and open channel flow?	**04**
	(c)	Enlist the major and minor loses in pipes. Derive the expression for loss of head due to sudden contraction.	**07**
Q.2	**(a)**	Explain hydraulically smooth and rough pipes	**03**
	(b)	Define boundary layer, laminar sub-layer, displacement thickness and momentum thickness	**04**
	(c)	Derive Darcy Weisbach formula for the loss of head due to friction in pipe line.	**07**
		OR	
	(c)	Calculate the head loss due to friction using Darcy Equation and power required to maintain 60 liters per second of liquid flow through a steel pipe 0.08 m radius and 900 m long. Take Sp. Gravity of the liquid = 0.85 and co-efficient of friction f=0.0025.	**07**
Q.3	**(a)**	Write the assumptions made in derivation of the Dynamic Equation of the Gradually varied flow	**03**
	(b)	Explain the Manning's formula in open channel flow	**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**
		OR	
Q.3	**(a)**	Define (i) Cavitation (ii) Prandtl Mixing length (iii) Water Hammer	**03**
	(b)	Enlist the important applications of Navier-stoke equations	**04**
	(c)	A trapezoidal channel is 4.5 m wide at bottom and has a side slope of 0.5H: 1V. The bed slope of the channel is 0.0003. Find the discharge of the most economical section. Assume Manning's coefficient n = 0.02	**07**
Q.4	**(a)**	What is priming? Why is it necessary in centrifugal pump?	**03**
	(b)	Discuss the phenomenon of boundary layer separation.	**04**
	(c)	Define the most economical channel section. Derive the condition for trapezoidal channel of best section	**07**
		OR	
Q.4	**(a)**	Derive the expression for displacement thickness.	**03**
	(b)	Define hydraulic jump? Discuss the types of jump based on Froude number	**04**
	(c)	A Francis turbine of 0.8 metre runner diameter working under a head of 3.0 metres at a speed of 150 rpm develops 80 kW when the rate of flow of water is 1.6 m^3 /s. If the head on the turbine is	**07**

increased to 10.5 metres determine the new speed, discharge and power.

Q.5	(a)	Discuss the types of the similarities.	03
	(b)	Compare Impulse turbine and Reaction Turbine.	04
	(c)	Explain construction and working of a pelton wheel	07

OR

Q.5	(a)	Define: Mechanical efficiency and Hydraulic efficiency	03
	(b)	Discuss the Distorted and Undistorted Models. What are the merits and demerits of Distorted Models?	04
	(c)	Explain the Buckingham's π- theorem for dimensional analysis	07

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