Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) EXAMINATION – SUMMER 2017

Subject Code: 2713303 **Date:10/05/2017**

Subject Name: ADVANCED FLUID MECHANICS

Time: 02:30 p.m. to 05:00 p.m. **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)**	Enlist the various methods of determining the co–efficient of viscosity of a liquid and describe any one method in detail.	**07**
	(b)	What do you understand by the boundary layer? Illustrate with reference to flow over a flat plate. Also cite some examples of boundary layer formation.	**07**
Q.2	**(a)**	Explain briefly the classification of open channel flows. Also give examples of each type of flow.	**07**
	(b)	Describe direct step method of calculating the length of back water curve.	**07**
		OR	
	(b)	Describe back water curve and draw down curve with examples.	**07**
Q.3	**(a)**	Derive the Hagen – Poiseuille equation for laminar flow in the circular pipe.	**07**
	(b)	How does the boundary layer thickness for flow over a flat plate vary with distance from the leading edge for laminar and turbulent flow?	**07**
		OR	
Q.3	**(a)**	Write a short note on hydraulically smooth and rough pipes.	**07**
	(b)	A smooth pipe line of 15 cm diameter conveys water at the rate of 0.05 m^3/s. compute the friction factor, maximum velocity and wall shear stress. Take kinematic viscosity of water = 0.001 stokes.	**07**
Q.4	**(a)**	Explain water hammer theory.	**07**
	(b)	Explain flow profiles on Horizontal and Adverse slope with neat sketch.	**07**
		OR	
Q.4	**(a)**	Derive an expression for loss of energy head for a hydraulic jump.	**07**
	(b)	Hydraulic jump occurs in a rectangular channel corresponding to F = 3.5 with initial depth equal to 0.6 m. Calculate critical depth and energy loss.	**07**
Q.5	**(a)**	Explain Positive and Negative surges with neat sketch.	**07**
	(b)	A wide rectangular channel (n = 0.015) carries a flow of 2.5 m^3/s per meter width. The bed slope of the channel is 0.005. Determine whether the channel slope is mild, steep or critical.	**07**
		OR	
Q.5	**(a)**	Why formation of wake behind a body causes drag.	**07**
	(b)	Discuss the basic components of total drag.	**07**

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