Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2713303

Subject Name: ADVANCED FLUID MECHANICS

Date:18/05/2016

Subject Name: ADVANCED FLUID 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) Distinguish between (i) steady and uniform flow (ii) Gradually varied flow and 07 Rapidly varied flow.
 - (b) Derive an expression for velocity distribution for viscous flow through a 07 circular pipe. Also sketch the distribution of velocity and shear stress across a section of the pipe.
- Q.2 (a) State the Momentum equation and mention some of its engineering 07 applications.
 - (b) What is a velocity defect? Derive an expression for the velocity defect for 07 turbulent flow in pipes.

OR

- (b) Explain various Boundary Layer parameters.
- **Q.3** (a) Explain water hammer theory.
 - (b) Oil of specific gravity 0.82 is pumped through a horizontal pipe line 15 cm in diameter and 3 km long at the rate of 900 litres per minute. The pump has an efficiency of 68% and requires 7.35 kW to pump the oil. Determine the dynamic viscosity of oil and verify whether the flow of oil is laminar.

OR

- **Q.3** (a) Explain hydraulically smooth and rough pipes.
 - (b) Calculate the friction drag on a plate 15 cm wide and 45 cm long placed 07 longitudinally in a stream of oil (specific gravity 0.925 and kinematic viscosity 0.9 stokes) flowing with a free stream velocity of 6 meters per second. Also find the thickness of the boundary layer and shear stress at the trailing edge.
- Q.4 (a) What do you understand by channel transitions? Clearly bring out the salient 07 differences between a venture flume and standing wave flume.
 - (b) Differentiate (i) alternate depths and conjugate depth (ii) back water and draw 07 down curves

OR

Q.4	(a)	Write assumption in GVF and derive the differential equation of GVF.	07
	(b)	Explain briefly classification of flow profiles with sketches.	07
Q.5	(a)	Describe direct step method of calculating the length of back water curve.	07
	(b)	Derive an expression for loss of energy head for a hydraulic jump.	07
		OR	
Q.5	(a)	Explain Positive and Negative surges with neat sketch.	07

(b) Derive differential equation of SVF with increasing discharge. 07

07

07

07