GUJARAT TECHNOLOGICAL UNIVERSITY ME - SEMESTER–I(New course)• EXAMINATION – WINTER- 2015

Subject Code: 2713303 Date: 0			2/01/2016	
Subject Name: Advanced Fluid Mechanics Time: 2:30 pm to 5:00 pm Instructions:		70		
	1. 2. 3.	Attempt all questions. Make suitable assumptions wherever necessary. Figures to the right indicate full marks.		
Q.1	(a) (b)	Give detail classification of flow in open channel. For generalized Couette flow, show that the discharge per unit width is given by, $q = \frac{Uh}{2} - \frac{h^3}{12\mu} \frac{dp}{dx}$	07 07	
Q.2	(a)	State various methods to measure the viscosity of a fluid and explain any one	07	
	(b)	Explain various flow profiles on horizontal and adverse slopes.	07	
	(b)	OR Derive Navier – Stokes equations of motion.	07	
Q.3	(a)	 Sketch the possible GVF profiles in the following serial arrangement of channels and controls. The flow is from left 1. Steep - steeper - mild - milder 2. Mild - sluice gate - steep - horizontal - drop 3. Sluice gate - adverse - horizontal - drop 	07	
	(b)	Describe various channel bottom slopes.	07	
Q.3	(a)	OR Derive the relationship between Froude numbers of flow and depths before and	07	
	(b)	after the hydraulic jump. Give classification of the hydraulic jump	07	
04	(U) (a)	Water flows at the rate of 2 m^{3}/s in a rectangular channel bed width 2 m	07	
Q. 1	(a) (b)	water nows at the rate of 2 m/s in a rectangular channel oed width 2 m. calculate critical depth. If a hydraulic jump is formed having pre jump depth 0.25 m, what would be the post jump height and energy loss. A trapezoidal channel carries a discharge of 10 m ³ /s with 5 m bed width, side slope 2H : 1V and bed slope 0.0002. Compute the back water profile created by a dam which backs up water to a depth of 2.5 m immediately behind the dam. Take n =0.02 and y ₀ = 1.62 m. solve by single step method. OR	07	
Q.4	(a) (b)	Discuss the phenomenon of boundary layer separation.	07	
05	(U) (a)	Explain hydro-dynamically smooth and rough pipes.	07	
Q.5	(a) (b)	Explain positive and negative surges. Explain method of characteristics.	07 07	
o -		OR	<u> </u>	
Q.5	(a) (b)	Explain Prandtl mixing length theory. Calculate the rate of flow of oil ($\mu = 0.8$ poise) flowing between two fixed plates kept at a distance of 20 mm apart. The drop of pressure in a length of 4 m is 4 X 10 ⁴ N/m ² . The width of the plate is 150 mm.	07 07	