## **GUJARAT TECHNOLOGICAL UNIVERSITY** PDDC- SEMESTER III- • EXAMINATION -WINTER- 2016

Subject Name: Advanced Fluid Mechanics			:06/01/2017	
		D:30 AM to 1:00 PM Total Marks: 70 ns: Attempt all questions.		
	2. 3.	Figures to the right indicate full marks.		
Q.1	(a) (b)	State and explain Buckingham's $\pi$ - theorem. Derive the expression of velocity distribution for viscous flow through circular pipe. Also sketch the velocity distribution and shear stress distribution across a section of the pipe.	07 07	
Q.2	(a) (b)	Explain Hardy-cross method of analysis for flow in pipe networks. Explain Euler's equation of motion for three dimensional flows. State its applications.	07 07	
	<b>(b</b> )	<b>OR</b> Derive an equation of Gradually varied flow, and write assumption made in it.	07	
Q.3	(a) (b)	Explain Prandtle's mixing length theory. Determine the most economical section of a rectangular channel carrying water at the rate of $0.5 \text{m}^3$ / s; the bed slope of the channels being 1 in 2000. Take Chezy's constant C = 50.	07 07	
		OR		
Q.3	(a) (b)	Define the term stream function. How does it differ by potential function? Determine the maximum discharge of water through a circular channel of diameter 1 m. When the bed slope of channel is 1 in 1100. Take $C = 60$ .	07 07	
Q.4	(a)	Describe Reynold's experiment and discuss the laminar and turbulent flow in	07	
	(b)	pipe. A model of spillway is made to test the flow. The discharge and velocity of flow over the model were measured as 2.5m <sup>3</sup> /sec and 1.5 m/sec. Find the discharge and velocity over prototype which is 30 times larger then it's model. <b>OR</b>	07	
Q.4	(a)	A fluid is flowing through a pipe of 0.30 m diameter having viscosity equal to $1.8 \text{ Ns/m}^2$ . Compute the shearing stress at the pipe wall and within the fluid 50mm from the pipe wall, if the maximum velocity is 2.5 m/s at the centre of pipe. Take sp gravity of fluid = 0.80.	07	
	(b)	Derive the relation for laminar flow between two parallel plates having the mean velocity equal to two-third of the maximum velocity.	07	
Q.5	(a) (b)	Describe various types of hydraulic models. Obtain an equation of continuity for three dimensional flows. <b>OR</b>	07 07	
Q.5	(a) (b)	Discuss the specific energy curve with a neat sketch. Discuss the classification of channel slopes.	07 07	

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