Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 713003N **Date: 03-01-2014**

Subject Name: Advanced Fluid Flow

Time: 10.30 am – 01.00 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)**	List various models of non Newtonian fluid and explain any two in detail.	**07**
	(b)	Draw the various flow patterns for two phase flow in vertical pipe?	**07**
Q.2	**(a)**	Derive the expression for the ratio of area occupied by the gas phase to the entire pipe for two phase flow?	**07**
	(b)	Explain in detail cone and plate viscometer?	**07**
		OR	
	(b)	Discuss in detail about two phase flow pattern map for horizontal pipes?	**07**
Q.3	**(a)**	Explain how is solid-solid and liquid – solid mixing achieved?	**07**
	(b)	Explain performance curves for centrifugal pumps?	**07**
		OR	
Q.3	**(a)**	Write a note on slurry transport?	**07**
	(b)	Explain scale up of stirred vessels?	**07**
Q.4	**(a)**	Derive the expression for the ratio of area occupied by the gas phase to the entire pipe for two phase flow?	**07**
	(b)	What is CFD and where is it used in chemical engineering?	**07**
		OR	
Q.4		A reaction is to be carried out in an agitated vessel. Pilot scale tests have been carried out under fully turbulent conditions in a tank 0.62 m in diameter, fitted with baffles and provided with a flat-bladed turbine, and it has been found that satisfactory mixing is obtained at a rotor speed of 4 Hz when the power consumption is 0.16 kW and the Reynolds number 160,000. What should be the rotor speed in order to achieve the same degree of mixing, if the linear scale of the equipment is increased by a factor of 6 and what will be the Reynolds number and the power consumption?	**14**
Q.5	**(a)**	Explain the concepts of suction lift, cavitation and priming for the centrifugal pumps?	**07**
	(b)	Where is the application of jet in chemical industry? Explain the method involved in any one operation?	**07**
		OR	
Q.5		A solution of sodium hydroxide of density 1650 kg/m^3 and viscosity 52 mNs/m^2 is agitated by a propeller mixer of 0.5 m diameter in a tank of 2.3 m diameter, and the liquid depth is 2.3 m. The propeller is situated 0.5 m above the bottom of tank. What is the power which the propeller must impart to the liquid for a rotational speed of 2 Hz.	**14**

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