Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Code: 2153612 **Date:05/12/2015**

Subject Name: Basics of Fluid Flow

Time:10:30am to 1:00pm **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)**	i.	Explain in detail the behavior of Newtonian and non Newtonian fluid with suitable examples.	**04**
		ii.	A liquid drop 30mm in radius has an internal pressure of 13 Pa greater than outside pressure. Find the surface tension of liquid film.	**03**
	(b)	i.	Describe the various conditions for equilibrium of submerged body	**03**
		ii.	What is meant by Vapor pressure? How it is related to the cavitation of fluid in a centrifugal pump?	**04**
Q.2	**(a)**		Derive Hagen Poiseuilli's equation for the laminar flow of an incompressible fluid through a pipe.	**07**
	(b)		A hydraulic press has a ram of 400 mm diameter and a plunger of 50 mm diameter. Find the weight lifted by the hydraulic press when the force applied at plunger is 800 N.	**07**
			OR	
	(b)		Derive the relationship to measure pressure difference between two points in case of fluid flowing through a pipe.	**07**
Q .3	**(a)**		With a neat sketch explain the main parts, construction and working principle of Centrifugal pump	**07**
	(b)		A pipeline of diameter 50 cm carries water from point A to B. The pressure at point A is 30N/cm^2 and at point B is 24 N/cm^2. The potential head at A is 30m and at point B is 32m. The volumetric flow rate of fluid is 0.6m^3/s. Determine the loss of head between A and B.	**07**
			OR	
Q.3	**(a)**		Calculate the power requirement in case of pumping water through a pipe of 0.40m diameter and 900 m long. The volumetric flow rate is 0.33 m^3/sec.	**07**
	(b)		Discuss the various cases of form friction losses in case of steady state flow of incompressible fluid through a pipe.	**07**
Q.4	**(a)**		Write about i) Steady State flow ii) Vena contracta iii) Reynolds Number iv) Stagnation point v)Stream line vi) transition length vii) Hydraulic radius	**07**
	(b)		With the help of diagram explain various type of heads in a pump.	**07**
			OR	
	(a)		Explain the concept of fluidization mentioning various types with their application in various industries.	
	(b)		With a neat sketch explain the main parts, construction and working principle of orifice meter? Derive the equation of discharge for an orifice meter.	**07**
Q.5	**(a)**		What is hydraulically smooth pipe signifying the importance of roughness parameter?	**07**

(b) Explain the various kinds of agitation equipments used in process industries. **07**

OR

Q.5 **(a)** Write a short note on flow pattern in agitated vessels with the ways adopted for prevention of swirling? **07**

(b) A fermentation broth with a viscosity 10^{-2}Pa s and density 1000 kg/m^3 is agitated in a 50m^{3}baffled tank using a marine propeller 1.3m in diameter. Calculate the power required for a stirring speed of 4s^{-1}. Assume the value of Np as 0.35 at the corresponding Reynolds number. **07**

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