## C.U.SHAH UNIVERSITY Winter Examination-2019

## Subject Name : Fluid Mechanics -I

	Subject (	Code : 4TE03FLM1	Branch: B.Tech (Civil)		
	Semester	<b>Date : 22/11/2019</b>	Time : 02:30 To 05:30	Marks : 70	
	(2) I (3) I			hibited.	_
Q-1		Attempt the following questions	s:	(	(14)
	a)	Define density of fluid.			
	b)	Write the mathematical represent	ation of Newton's Law of viscosity.		
	c)	Enlist the classification of manon	neter.		
	d)	Write the name of commonly use	ed manometer liquid.		
	e)	Write the practical application of	Bernoulli's equation.		
	f)	What is the difference between C	ipolletti weir and rectangular weir?		
	<b>g</b> )	The rate of flow through a V note	ch varies as		
	<b>h</b> )		<sup>2</sup> (iv) H <sup>3/2</sup> adding and		
	i) j)	State Hydrostatic law. In a pipe flow, If the Reynolds nu	umber is more than 4000, the flow is s	aid to be	
	k)	Define streak line.			
	l) m) n)	Write continuity equation. Bernoulli's equation is based on Define Bouncy.	which law.		
Atte	empt any f	our questions from Q-2 to Q-8			
Q-2		Attempt all questions		(	(14)



	(a)	A simple U- tube manometer containing mercury is connected to a pipe in which an oil of specific gravity 0.89 is flowing. The pressure in the pipe is vacuum. The other end of the manometer is open to the atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 20cm and height of oil in the left limb from the centre of pipe is 15 cm below.	07
	(b)	What is the difference between dynamic viscosity and kinematic viscosity? State their units of measurements	03
	( <b>c</b> )	Explain the types of fluid with neat sketch.	04
Q-3		Attempt all questions	(14)
	(a)	A wooden block of width 2m, depth 1.5m and length 4m floats horizontally in water. Find the volume of water displaced and position of centre of buoyancy. Specific gravity of the wooden block is 0.72.	06
	(b)	A plate 0.025 mm distant from a fixed plate, moves at 50 cm/s and requires a force of $1.481$ N/m <sup>2</sup> to maintain this speed. Determine the fluid viscosity between the plate in the poise.	06
	(c)	State the Pascal's law.	02
Q-4		Attempt all questions	(14)
<b>v</b> ·	(a)	State Bernoulli's equation and write its assumption.	04
	(b)	A 40 cm diameter pipe, conveying water, branches into two pipes of diameters 30 cm and 20cm respectively. If the average velocity in the 40cm diameter pipe is 3 m/s. find the discharge in this pipe. Also determine the velocity in 20 cm pipe if the average velocity in 30cm diameter pipe is 2 m/s.	07
	(c)	Explain the continuity equation with neat sketch.	03
Q-5		Attempt all questions	(14)
Ų۶	(a)	Determine the viscosity of a liquid having kinematic viscosity 6 stokes and	04
	(b)	specific gravity 2.00. Find out the minimum size of glass tube that can be used to measure water level	07
		if the capillary rise in the tube is to be restricted to 5 mm. consider surface	01
	( <b>c</b> )	tension of water in contact with air as 0.073575 N/m. Enumerate the types of forces acting in the fluid flow.	03
Q-6		Attempt all questions	(14)
¥.∩	(a)	Write short notes on losses in pipe.	05
	(b)	Explain the terms 'Meta- centre' and meta centric height.	05
	( <b>c</b> )	Define an orifice and a mouthpiece. What is the difference between the two?	04
Q-7		Attempt all questions	(14)
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(a) Explain the classification of orifice and mouthpieces based on their shape, size 07



and sharpness?

(b) The head of water over an orifice of diameter 50 mm is 12m. find the actual 07 discharge and actual velocity of jet at vena-contracta. Take  $C_d = 0.6$  and  $C_v = 0.98$ 

## Q-8 Attempt all questions

- (a) A horizontal venturimeter with inlet and throat diameters 30 cm and 15 cm **07** respectively is used to measure the flow of water. The reading of differential manometer connected to inlet and throat is 10 cm of mercury. Determine the rate of flow. Take  $C_d = 0.98$ .
- (b) A jet of water, issuing from a sharp-edged vertical orifice under a constant head of 10 cm, at a certain point, has the horizontal and vertical co-ordinates measured from the vena- contracta as 20 cm and 10 cm respectively. Find the value of  $C_{v.}$  Also find the value of  $C_c$  if  $C_d = 0.6$



(14)