# C.U.SHAH UNIVERSITY **Summer Examination-2020**

### Subject Name : Fluid Mechanics -I

	Subject (	Code:4TE03FL	M1	Branch: B.Tech	(Civil)	
	Semester	: 3 Date	: 05/03/2020	Time : 02:30 To	05:30 Marks :70	
	Instructio (1) U (2) I (3) I (4) A	ns: Jse of Programma nstructions writter Draw neat diagram Assume suitable da	ble calculator & and n on main answer bo ns and figures (if new ata if needed.	y other electronic instru ook are strictly to be ob cessary) at right places.	ment is prohibited. eyed.	
Q-1		Attempt the foll	lowing questions:		(1	14)
	a) b)	Bernoulli's equa Define Bouncy.	ation is based on wh	nich law.		
	c) d)	Friction loss in p What is meant by	vipes is also called y ideal fluid?	loss.		
	e) f)	Write the relation Draw the stress-s	nship between dens	ity and specific weight. Newtonian fluid.		
	g) h)	Write down the u Enumerate the cl	units of kinematic v lassification of man	iscosity. ometer.		
	i) j)	Define gauge pro What is meant by	essure. y crest?			
	<b>k</b> ) Write Darcy - Weisbach formula for calculating head loss.					
	l) m)	he flow is said to be				
	n)	The Bernoulli's (a) Mass	equation is based or b) Energy	n conservation of c) Angular Momentum	d) Linear Momentum	



## Attempt any four questions from Q-2 to Q-8

Q-2	<ul> <li>Attempt all questions</li> <li>(a) A plate 0.035 mm distant from a fixed plate, moves at 50 cm/s and read force of 1.471N/m<sup>2</sup> to maintain this speed. Determine the fluid viscosity is the plate in the poise.</li> </ul>		(14) 07
	<b>(b)</b>	What do you understand by 'Hydrostatic law'?	03
	(c)	Explain the phenomenon of capillarity. Obtain an expression for capillary rise of liquid.	04
Q-3		Attempt all questions	(14)
	(a)	Explain the terms 'Meta- centre' and meta centric height.	06
	(b)	Find out the minimum size of glass tube that can be used to measure water level if the capillary rise in the tube is to be restricted to 2 mm. Consider surface tension of water in contact with air as 0.073575 N/m.	04
	( <b>c</b> )	Define vena-contra. Differentiate between small and large orifice.	04
Q-4		Attempt all questions	(14)
	(a)	Explain the continuity equation.	04
	(b)	A simple manometer is used to measure the pressure of oil (sp. Gr.= 0.79) flowing in a pipe line. Its right limb is open to the atmosphere and left is connected to the pipe. The centre of the pipe is 10 cm below the level of mercury (sp. Gr. =13.6) in the right limb. If the difference of mercury level in the two limbs is 15cm, determine the absolute pressure of the oil in the pipe in N/cm <sup>2</sup> .	07
	(c)	Explain the terms Dynamic Viscosity and Kinematics Viscosity. Also discuss the effect of temperature on viscosity.	03
Q-5	(a)	Attempt all questions State Bernoulli's equation and write its assumption.	
	(b)	Water is flowing through a pipe having diameter 300 mm and 150 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is $24.55 \text{ N/cm}^2$ and the pressure at the upper end is $9.81 \text{ N/cm}^2$ . Determine the difference in datum head if the rate of flow through pipe is $35 \text{ lit/s}$ .	07
Q-6	(c)	Differentiate between Laminar flow and Turbulent flow. Attempt all questions	03 (14)
Q U	(a)	Write short notes on losses in pipe.	05
	(b)	Enlist the types of fluid flow and explain it.	05
	(c)	Classify different types of orifices and write down the equations for hydraulic coefficients used in it.	04



### Q-7 Attempt all questions

- (a) A wooden block of width 3m, 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.
- (b) Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one third of the flow in AB. The flow velocity in branches is CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.

#### Q-8 Attempt all questions

- (a) The head of water over an orifice of diameter 100 m is 10 m. the water coming out from orifice is collected in a circular tank of diameter 1.5 m. the rise of water level in this tank is 1 m in 25 seconds. Also the co-ordinate of a point on jet, measured from vena-contracta are 4.3 m horizontal and 0.5 m vertical. Find the Coefficients C<sub>d</sub>, C<sub>v</sub> and C<sub>c</sub>.
- (b) A 30 cm x 15 cm venturimetre is inserted in vertical pipe carrying water, flowing in the upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 20 cm. find discharge. take Cd = 0.98



(14)

(14)