Enrollment No: _____   Exam Seat No:_____

C. U. SHAH UNIVERSITY
Winter Examination-2020

Subject Name: Fluid Mechanics - I

Subject Code: 4TE03FLM1   **Branch: B.Tech (Civil)**

Semester: 3   **Date: 15/03/2021**   **Time: 11:00 To 02:00**   **Marks: 70**

Instructions:
(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1   **Attempt the following questions:**   **(14)**

a) As compared to flat plate, force of jet on a semi-circular vane will be   1
(a) Half (b) Equal (c) Double (d) Triple

b) In MLT system the dimensions of specific volume would be   1
(a) L^3 (b) ML^3 (c) ML^{-3} (d) $M^{-1}L^3$

c) A flow in which each liquid particle has definite path, and the paths of individual particle do not cross each other is called   1
(a) Steady flow (b) Uniform flow (c) Streamline flow (d) Turbulent flow

d) Liquids   1
(a) Have no shape (b) Cannot be compressed (c) Both (a)and(b) (d) None

e) When the metacentre of a floating body is lower than the centre of gravity, then the body will be in   1
(a) Unstable equilibrium   (b) Stable equilibrium
(c) Neutral equilibrium   (d) None of the above

f) Bernoulli's theorem deals with the principal of conservation of   1
(a) Energy (b) Momentum (c) Mass (d) Force

g) Weir may also be used to measure   1
(a) Velocity of flow (b) Pressure (c) Discharge in river (d) Kinetic energy

h) The tendency of small drop of fallen water to remain in a spherical form is due to the property of   1
(a) Viscosity (b) Adhesion (c) Capillary action (d) Surface tension

i) Bernoulli's equation is applied to   1
(a) Venturimeter (b) Orifice meter (c) Pitot tube (d) All the above

j) A flow through long pipe at constant rate is called   1
(a) Steady uniform flow   (b) Steady non-uniform flow
(c) Unsteady uniform flow   (d) Unsteady non-uniform flow

k) The weight per unit volume of a liquid at a standard temperature and pressure is called   1
(a) Specific weight (b) Mass density (c) Specific gravity (d) None

l) A flow in which the velocities of liquid particles at all sections of the pipe or channel are equal, is called as   1

(a) Uniform flow (b) Laminar flow (c) Turbulent flow (d) Unsteady flow

m) In an open cylindrical tank filled with water, a hole is made at the mid-point at the bottom. The spiral motion of the outgoing water is   1
(a) Rotational (b) Irrotational (c) Forced vortex (d) Turbulent

n) In venturimeter, the ratio between throat diameter and pipe diameter is generally adopted as   1
(a) 1 : 2 (b) 1 : 4 (c) 1 : 8 (d) 2 : 11

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

Q-2		**Attempt all questions**	**(14)**
	A	Explain how you will determine the meta-centre height of a floating body experimentally? Explain with neat sketch.	**7**
	B	State and Prove Euler's equation of motion of a fluid element along a stream line stating the principle used.	**7**
Q-3		**Attempt all questions**	**(14)**
	A	Explain briefly the following: i) Hydraulic gradient line ii) Energy gradient line.	**7**
	B	Explain jet impingement upon a stationary flat plate.	**7**
Q-4		**Attempt all questions**	**(14)**
	A	Explain with sketch the relationship between the absolute pressure, atmospheric pressure and gauge pressure.	**7**
	B	Enlist various types of manometers and explain inverted differential manometer in details.	**7**
Q-5		**Attempt all questions**	**(14)**
	A	Define the following terms: (i) Static pressure , (ii) Atmospheric pressure, (iii) Gauge pressure, (iv) Absolute pressure, (v) Buoyancy (vi) Meta centric height, (vii) Hydraulic gradient line.	**7**
	B	Derive continuity equation for 2-D incompressible flow in Cartesian form stating the assumption made and principle involved.	**7**
Q-6		**Attempt all questions**	**(14)**
	A	Drive discharge coefficient of Venturimetre.	**7**
	B	Differentiate between the following : (i) Laminar flow and Turbulent flow (ii) Steady flow and Unsteady flow.	**7**
Q-7		**Attempt all questions**	**(14)**
	A	A pipe 20 cm in diameter and 45m long conveys water at a velocity of 2.5 m/sec.Find the head lost in friction 1) Using the Darcy weisbach formula 2) Using Chezy's equation Take f = 0.006 and C = 57	**7**
	B	Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet.	**7**
Q-8		**Attempt all questions**	**(14)**
	A	Write brief notes on following: (i) Narrow crested weir (ii) Ogee weir	**7**
	B	The velocity vector in a fluid flow is given V= 4x3 i- 10x2 y j+ 2t k Find the velocity and acceleration of fluid particle at (2, 1, 3) at time t=1.	**7**