Enrollment No: _____ Exam Seat No:_____

C. U. SHAH UNIVERSITY
Winter Examination-2021

Subject Name: Fluid Mechanics - I

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

Semester: 3 Date : 12/01/2022 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) Density of water is maximum at
(i) 0°C (ii) 0°K (iii) 4°C (iv) 100°C

b) Property of a fluid by which molecules of different kinds of fluids are attracted to each other is called
(i) adhesion (ii) cohesion (iii) viscosity (iv) compressibility

c) Which of the following is dimensionless?
(i) specific weight (ii) specific volume (iii) specific speed (iv) specific gravity

d) The units of viscosity are
(i) metres^2 per sec (ii) kg sec/metre (iii) newton-sec per metre^2 (iv) newton-sec per meter

e) Kinematic viscosity is dependent upon
(i) pressure (ii) distance (iii) flow (iv)density

f) Falling drops of water become spheres due to the property of
(i) adhesion (ii) cohesion (iii) surface tension (iv) viscosity

g) The term Fluid includes
(i) liquid (ii) gases (iii) both (i) & (ii) (iv) none of them

h) Fluid is a substance that offers no resistance to change of
(i) pressure (ii) flow (iii) shape (iv) volume

i) Property of a fluid by which its own molecules are attracted is called
(i) adhesion (ii) cohesion (iii) viscosity (iv) compressibility

j) The path followed by a fluid particle in motion is called a
i) stream line ii) path line iii) streak line iv) none of the above

k) If the Reynolds number is less than 2000, the flow in a pipe is known as
i)laminar flow ii) turbulent flow iii) transition flow iv) none of the above

l) High-velocity flow in a conduit of large size is known as
i) laminar flow ii) turbulent flow iii) transition flow iv) none of the above

m) An ideal fluid is one where no friction effects are present. Another term

for ideal fluid is _____ fluid.
(i) Oil (ii) Water (iii) Petrol (iv) Non-Viscous

n) The center of gravity of the volume of the liquid displaced by an immersed body is called
(i) meta-center (ii) center of pressure (iii) center of buoyancy
(iv) center of gravity

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

Q-2 **Attempt all questions**

a) Define the term: Density, Specific Weight, and Specific Volume. **3**

b) Derive the formula to find surface tension on a Hollow bubble. **4**

c) Write a note on types of fluids. **7**

Q-3 **Attempt all questions**

a) Define the term: Vaccum Pressure, Absolute Pressure, and Gauge Pressure **3**

b) The weight of the stone is 530N in air and reduces to 200N while submerging it into water. Find the specific gravity of the stone. **4**

c) State the hydrostatic law and derive the formula to find out pressure. **7**

Q-4 **Attempt all questions**

a) Discuss continuity equation. **3**

b) The diameter of a pipe at the section 1 and 2 are 10cm and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/s. Determine also the velocity at section 2. **4**

c) What is Euler's equation of motion? How will you obtain Bernoulli's equation from it and write its assumption? **7**

Q-5 **Attempt all questions**

a) Define clearly stream line, Path line, and steady flow. **3**

b) The velocity components in a two-dimensional flow of an incompressible fluid are $u= 2x^2 y$ and $v= -2y^2 x$. State that it is a possible case of fluid flow **4**

c) A three-dimensional flow field is described by $V= (2x^2y)i-(y^2Z)J+(yz^2-4xyz)k$ prove that it is a possible case of steady fluid flow and calculate the velocity at point (3,2,1). **7**

Q-6 **Attempt all questions**

a) Mention the distinguishing features between notches and weir. **3**

b) Explain the functioning of the Velocity-Pilot Tube. **4**

c) An oil of Specific gravity 0.8 is flowing through a venturi meter having an inlet diameter of 150mm and a throat diameter of 75mm. The oil-mercury differential manometer shows a reading of 20cm. Compute the discharge of oil through the pipe. Take $C_d = 0.98$ and Specific gravity of mercury =13.6 **7**

Q-7 **Attempt all questions**

a) Define hydraulic gradient line and Total energy line. **3**

b) Give detailed classification of loss of energy in pipe flow. **4**

c) A pipeline of a length of 2000m is used for power transmission. If **7**

110.3625kw power is to be transmitted through the pipe in which water having a pressure of 490.5 N/cm^2 at the inlet is flowing. Find the diameter of the pipe and efficiency of power transmission if the pressure drop over the length of pipe is 98.1 N/cm^2. Take f=0.0065.

Q-8 **Attempt all questions**

a)	Define the term: Buoyancy force, Centre of Buoyancy, and Archimedes Principle.	**3**
b)	Explain principles of Jet Propulsion	**4**
c)	What is dimensional analysis? Explain secondary quantities with example	**7**