



Roll No:														
----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--

B. TECH
(SEM III) THEORY EXAMINATION 2020-21
FLUID MECHANICS

Time: 3 Hours**Total Marks: 100****Note:** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief. 2 x 10 = 20**

a.	What do you understand by buoyant force?
b.	Define gauge pressure and absolute pressure.
c.	What is surface tension?
d.	Define Laminar and Turbulent flow.
e.	State Bernoulli's Theorem.
f.	What do you understand by HGL and TEL?
g.	Define Impulse Momentum Equation.
h.	What is the difference between Notches and Weirs?
i.	What do you understand by displacement thickness?
j.	Differentiate between Model and Prototype.

SECTION B**2. Attempt any three of the following: 10x3=30**

a.	Derive continuity equation for three dimensional steady or unsteady flow in a Cartesian coordinate system.
b.	What do you understand by Streamlines, equipotential lines and flow net? Also prove that equipotential lines and stream lines intersect each other orthogonally.
c.	State and explain Major energy losses and minor energy losses in pipe with the help of neat sketches.
d.	Find the expression for the discharge over a rectangular notch in terms of head of water over the crest of the notch.
e.	Prove that viscous flow through a circular pipe the kinetic energy correction factor equal to 2.

SECTION C**3. Attempt any one part of the following: 10x1=10**

a.	What is a manometer? How they are classified? Explain the details with the help of neat diagrams.
b.	Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of the plate is 3m below the free surface of water. Find the position of centre of pressure also.

4. Attempt any one part of the following: 10x1=10

a.	State Buckingham's π - theorem. What are repeating variables? How are these selected in dimensional analysis?
b.	The following cases represent the two velocity components, determine the third component of velocity such that they satisfy the continuity equation:



Roll No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(i) $u = x^2 + y^2 + z^2$, $v = xy^2 - yz^2 + xy$ (ii) $v = 2y^2$, $w = 2xyz$
--

5. Attempt any one part of the following:**10x1=10**

a.	What is a Venturimeter? Derive an expression for the discharge through a Venturimeter.
b.	Water flows over a rectangular weir 1 m wide at a depth of 150 mm and afterwards passes through a triangular right-angled weir. Taking C_d for the rectangular and triangular weir as 0.62 and 0.59 respectively. Find the depth over the triangular weir.

6. Attempt any one part of the following:**10x1=10**

a.	Derive an expression for the velocity distribution for viscous flow through circular pipe. Also sketch the velocity distribution and shear stress distribution across a section of the pipe.
b.	Discuss in details about Undistorted Models and Distorted Models. Also explain Scale Ratios for Distorted Models.

7. Attempt any one part of the following:**10x1=10**

a.	What do you understand by momentum thickness, displacement thickness and energy thickness?
b.	A kite weighing 7.848 N has an effective area of 0.8 m^2 . It is maintained in air at an angle of 10° to the horizontal. The string attached to the kite makes an angle of 45° to the horizontal and at this position the value of co-efficient of drag and lift are 0.6 and 0.8 respectively. Find the speed of the wind and the tension in the string. Take the density of air as 1.25 kg/m^3 .