

B.TECH
(SEM-III) THEORY EXAMINATION 2019-20
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 for Diffusers?
b.	Define Stokes Law.
c.	Define Turbulent Boundary layer.
d.	Explain the Drag and Lift.
e.	Write important Characteristics of Stream Line.
f.	Write the difference between Eulerian and Lagrangian approach.
g.	Write short note on Pitot Static Tube.
h.	Explain gauge pressure, vacuum pressure and absolute pressure with suitable sketch.
i.	Define the term Cohesion and Adhesion.
j.	Distinguish between Rotational and Irrigational Flows.

SECTION B

2. Attempt any three of the following:

10x3=30

a.	What do you mean by Separation of Boundary Layer?
b.	Derive the expression for the energy head loss in a pipe expansion
c.	Determine the thickness of the boundary layer at the trailing edge of smooth plate of length 4mtr and width 1.5mtr. when the plate is moving with a velocity of 4m/s in stationary air. Take kinematic viscosity of air $1.5 \times 10^{-5} \text{ m}^2/\text{s}$.
d.	Derive expressions for any two dimensionless numbers.
e.	What is the importance of Model Testing?

SECTION C

3. Attempt any one part of the following:

10x1=10

a.	Prove that the viscous flow through a circular pipe the kinetic energy correction factor is equal to 2.
b.	A horizontal pipe suddenly enlarges from a diameter 250mm to 500mm. the discharge of water through the pipe is $0.3 \text{ m}^3/\text{s}$ and the intensity of pressure in the smaller diameter pipe is 100 kN/m^2 . Determine (i) The head loss due to sudden enlargement (ii) Power loss due to enlargement (iii) Intensity of pressure in the larger diameter

4. Attempt any one part of the following:

10x1=10

a.	Find the discharge from an 80mm diameter external mouth piece fitted to a side of a large vessel if the head over the mouthpiece is 6mtr.
b.	What do you understand by total pressure and center of pressure? A circular plate 2.5m diameter is immersed in water, its greatest and least depth below the free surface being 3m and 1m respectively. Find total pressure and center of pressure.

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

a.	A tank contains water up to the height of 0.5m above the base. An immiscible liquid of specific gravity 0.8 is filled on the top of the water up to 1m height. Calculate total pressure on one side of the tank and the position of center of pressure.
b.	How momentum equation used in determining the force exerted by a flowing fluid in pipe bend?

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

a.	Find the discharge through a trapezoidal notch which is 1 m wide at the top and 0.4 m at the bottom and is 30 cm in height. The head of water on the notch is 20 cm. Assume C_d for rectangular portion = 0.62 while for triangular portion = 0.60.
b.	Explain the VON Karman Integral Momentum Equation

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

a.	Discuss geometric, kinematic and dynamic similarity. Are these equations obtainable?
b.	Derive Bernoulli's equation using Euler equation of motion.