PAPER ID-311105

Subject Code: KCE303

Roll No: | | | | | | | | | | | | | |

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

Time: 3 Hours **Total Marks: 100**

SECTION A

1. Attempt *all* questions in brief. **2 x 10 =20**

Q.No.	Question	Marks	CO
a.	Define Specific Volume.	2	1
b.	Define Gauge Pressure and Absolute Pressure.	2	1
c.	What is Laminar and Turbulent flow?	2	2
d.	Write the difference between Eulerian and Lagrangian approach.	2	2
e.	State the assumptions of Bernoulli's equation.	2	3
f.	What do you understand Notches and Weirs?	2	3
g.	Explain Impulse Momentum Equation.	2	4
h.	Distinguish between Model and Prototype.	2	5
i.	Explain the Drag and Lift.	2	4
j.	Discuss about Euler's Equation of Motion.	2	3

SECTION B

2. Attempt any *three* of the following: **3 x 10 =30**

Q.No	Question	Marks	CO
a.	A simple U-tube manometer containing mercury is connected to a pipe in which a fluid of sp. gr. 0.8 and having vacuum pressure is flowing. The end of the manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of mercury level in the two limbs is 40 cm and the height of fluid in the left from the centre of pipe is 15 cm below.	10	3
b.	With the help of a diagram explain streamlines, equipotential lines and flow net. Prove that equipotential lines and stream lines intersect each other orthogonally.	10	4
c.	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 the triangular weir as 0.62 and 0.59 respectively, find the depth over the triangular weir.	10	3
d.	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.	10	4
e.	The water is flowing through a taper pipe of length 100 m having diameters 600 mm at the upper end and 300 mm at the lower end, at the rate of 500 litres/s. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62 N/cm^2.	10	3

SECTION C

Roll No: | | | | | | | | | | | | | |

3. Attempt any *one* part of the following: 1 x 10 =10

Q.No	Question	Marks	CO
a.	What is a Manometers ? How are they classified? Explain in details.	10	1
b.	A rectangular plane surface is 2 m wide and 3 m deep. It lies in vertical plane in water. Determine the total pressure and position off center pressure on the plane surface when its upper edge is horizontal and (i) coincides with water surface (ii) 2.5 m below the free water surface.	10	1 o

4. Attempt any *one* part of the following: 1 x 10 =10

Q.No.	Question	Marks	CO
a.	Derive the continuity equation for a three dimensional steady or unsteady flows in a Cartesian coordinate system.	10	2
b.	If for the two dimensional potential flow, the velocity potential is given by $\phi = x(2y-1)$, determine the velocity at the point P (4, 5). Determine also the value of stream function at the point P.	10	2

5. Attempt any *one* part of the following: 1 x 10 =10

Q.No.	Question	Marks	CO
a.	The rate of flow of water through a horizontal pipe is 0.25 m^3/s. The diameter of the pipe which is 200 mm is suddenly enlarged to 400 mm. The pressure intensity in the smaller pipe is 11.772 N/cm^2 Determine loss of head due to sudden enlargement and pressure intensity in the large pipe.	10	3
b.	What is a Venturimeter ? Derive an expression for the discharge through a Venturimeter.	10	3

6. Attempt any *one* part of the following: 1 x 10 =10

Q.No.	Question	Marks	CO
a.	An oil of viscosity 0.1 Ns/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and a length of 300 m. The rate of flow of fluid through the pipe is 3.5 litres/s. Find the pressure drop in a length of 300 m and also the shear stress at the pipe wall.	10	4
b.	Define displacement thickness. Derive an expression for the displacement thickness.	10	4

7. Attempt any *one* part of the following: 1 x 10 =10

Q.No.	Question	Marks	CO
a.	A kite 0.8 m x 0.8 m weighing 0.4 kgf (3.924 N) assumes an angle of 12° to the horizontal. The string attached to the kite makes an angle of 45° to the horizontal. The pull on the string is 2.5 kgf (24.525 N) when the wind is flowing at a speed of 30 km/hour. Find the corresponding co-efficient of drag and lift. Density of air is given as 1.25 kg/m^3.	10	5
b.	State Buckingham's π – theorem. What are repeating variables? How are these selected in dimensional analysis?	10	5