Sub Code:KCE303

Paper Id: 100323 Roll No:

B. TECH
(SEM-III) THEORY EXAMINATION 2019-20
FLUID MECHANICS

Time: 3 Hours *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

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

Qno.	Question	Marks	CO
a.	Define weight density.	2	1
b.	Define Piezometer with neat sketch.	2	1
c.	What are stream tube?	2	2
d.	What do you understand by Rate of flow?	2	2
e.	Write practical application of Bernoulli's equation.	2	3
f.	Draw the neat sketch of venutrimeter.	2	3
g.	Define stokes's Law.	2	4
h.	Distinguish between ratational and irrotaional flow.	2	4
i.	What are the Magnus effects?	2	5
j.	What is flow separation?	2	5

SECTION B

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

Qno.	Question	Marks	CO
a.	Given that : Barometer reading =740 mm of mercury, specific gravity of mercury =13.6 , intensity of pressure =40 kPa. Express the intensity of pressure in S.I. units, both gauge and absolute.	10	1
b.	Sketch the velocity distribution for uniform irrotational flow.	10	2
c.	Find an expression for the discharge over a rectangular notch in terms of head of water over the crest of the notch.	10	3
d.	Prove that viscous flow through a circular pipe the kinetic energy correction factor equal to 2.	10	4
e.	Give and explain the five errors in CFD and give examples. How can they be determined and reduced?	10	5

SECTION C

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

Qno.	Question	Marks	CO
a.	A crude oil of viscosity 0.97poise and relative density= 0.9 is flowing through a horizontal circular pipe of diameter 100mm and length 10m.Calculate the difference of pressure at two of the pipe, if 100kg of the oil is collected in tank in 30seconds.	10	1
b.	Explain briefly the following types of equilibrium of floating bodies (i) Stable Equilibrium (ii) Unstable Equilibrium (iii) Neutral Equilibrium	10	1

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

Qno.	Question	Marks	CO
a.	Write examples of viscous flow and explain the characteristics of Laminar flow.	10	2
b.	Find the velocity and acceleration at a pont (1,2,3) after 1 sec. for a three dimensional flow given by u=yz+t, v=xz-t, w=xy m/s	10	2

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

Qno.	Question	Marks	CO
a.	A horizontal pipe of diameter 450 mm is suddenly contracted to a diameter of 200 mm. The pressure intensities in the large and smaller pipe is given as 13.734N/cm^2 and 11.774 N/cm^2 respectively. Find the loss of head due to contraction if C_c=0.62. Also determine the rate of flow of water.	10	3
b.	Derive an expression for the power transmission through the pipes. Find also the condition of power and corresponding efficiency of transmission	10	3

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

Qno.	Question	Marks	CO
a.	If velocity distribution in laminar boundary layer a flat plate is assumed to be given by second order polynomial u=a+by+cy^2. Determine its form using the necessary boundary conditions.	10	4
b.	Prove that in case of force vortex, the rise of liquid level at the ends is equal to the full liquid level at the axis of rotation.	10	4

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

Qno.	Question	Marks	CO
a.	What is meant by geometric, kinematic and dynamic similarities? Are these similarities truly attainable? If is not why?	10	
b.	A 1:40 model of ocean tanker is dragged through fresh water at 2m/s with total measured drag of 117.7 N. The skin (frictional) drag co-efficient 'f' for model and prototype are 0.3 and 0.02 respectively in the equation R_f=fAV^2. The water surface area of the model is 25m^2. Taking the densities for the prototype and the model as 1030 kg/m^3 and 1000 kg/m^3 respectively, Determine (i) The total drag on the prototype (ii) Power required to drive the prototype.	10	