



TKRCEET
HYDERABAD
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R22 Regulation *Subject code: 4E3AC*
TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
 (Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Semester Regular/Supplementary Examinations, December 2024
FLUID MECHANICS
 (CE)

Maximum Marks: 60

Date: 06.12.2024

Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

PART-A		CO	Bloom Tx
All the following questions carry equal marks (10X1M=10 Marks)			
1.a)	Explain incompressible fluids.	1	L1
b)	What is a manometer, and how is it used to measure fluid pressure.	1	L1
c)	Write the continuity equation for two-dimensional flow.	2	L1
d)	What is the significance of circulation and vorticity in fluid flow?	2	L1
e)	When will the body floats on fluids?	3	L1
f)	Explain the working principle of Orifice meter.	3	L1
g)	Derive the expression for Reynold's number?	4	L1
h)	Write the Darcy –Weisbach formula	4	L1
i)	Differentiate displacement thickness and energy thickness	5	L1
j)	Illustrate the examples of formation of boundary layer in day to day life.	5	L1
PART-B		CO	Bloom Tx
Answer All the following questions. (5X10M=50Marks)			
2	a. Differentiate between: [1+1+1 M] i) Liquids and Gases ii) Cohesion and Adhesion iii) Real fluid and Ideal fluid	1	L2
	b. An oil of viscosity 5 poise is used for lubrication between a shaft and sleeve. The diameter of shaft is 0.5 m and it rotates at 200 rpm. Calculate the power lost in the oil for a sleeve length of 100 mm. The thickness of the oil film is 1.0 mm. [7M]	1	L3
OR			
3	a. Derive the expression for the hydrostatic force acting on a vertical, submerged plane surface. [5M]	1	L2
	b. Calculate the total hydrostatic force acting on a rectangular vertical plane surface of dimensions 2 m × 3 m, which is submerged 1.5 m below the free surface of water (assume water density = 1000 kg/m ³). [5M]	1	L3
4	a. Write Classification of Flows in detail. [4M]	2	L2
	b. Explain the Concept of Stream Function and Derive Its Mathematical Relationship in Two-Dimensional, Incompressible Flow. [6M]	2	L3

	OR		
5	Derive the equation of continuity for one, two & three dimensional flows [10M]	2	L2
6	a. Derive the expression for the rate of flow of fluid through a horizontal Venturimeter. [5M]	3	L2
	b. A pitot static tube is used to measure the velocity of water in a pipe. The stagnation pressure head is 6m and static pressure head is 5m. Calculate the velocity of flow assuming the coefficient of tube equal to 0.98. [5M]	3	L3
	OR		
7	a. Describe the different types of notches with neat diagrams. [5M]	3	L2
	b. Find the throat diameter of a venturimeter, when fitted to a horizontal main 10 cm diameter having a discharge of 20 litres per second. Pressure gauges inserted at the entrance and throat indicate pressures 158 kPa and 82 kPa respectively. Take $C_d = 0.95$. [5M]	3	L3
8	a. Show that the loss of head due to sudden expansion in pipe line is a function of velocity head. [5M]	4	L2
	b. In a pipe of diameter 100 mm and length 400 mm, water is flowing at a velocity of 3.5 m/s. Find the head loss due to friction using (i) Darcy – Weisbach formula (ii) Chezy's formula for which $c = 55$. [2½ M+ 2½M]	4	L3
	OR		
9	a. Derive the expression for flow through pipes in series and parallel. [5M]	4	L2
	b. A pipe line of 0.6 m diameter is 1.5 km long. To increase the discharge, another line of same diameter is introduced parallel to the first in the second half of the length. Neglecting minor losses, find the increase in discharge if $4f = 0.04$. The head at inlet is 300 mm. [5M]	4	L3
10	Analyze the following boundary layer parameters for the velocity distribution $u/U = (y/\delta)^{2/3}$: i) Displacement thickness, ii) Momentum thickness, iii) Energy thickness, [3+3+4 M]	5	L3
	OR		
11	Explain about separation and control of boundary layer and define lift force and drag force [10M]	5	L3