R22 Regulation *Subject code: 4EBAC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Semester Supplementary Examinations, July 2024

Fluid Mechanics

(Civil Engineering)

Maximum Marks: 60 Date:23.07.2024 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)	State Pascal's law.	1	I
b)	A soap bubble, 40 mm in diameter contains pressure (in excess of atmospheric) of 2 bar. Find the surface tension in the soap film.	1	III
c)	What is potential and stream function?	2	I
d)	Define buoyancy.	2	I
e)	Mention the assumptions in Bernoulli's equation.	3	II
f)	What is momentum equation?	3	I
g)	Give the physical significance of Reynold's number.	4	II
h)	What are minor losses in flow through a pipe?	4	I
i)	Differentiate displacement thickness and energy thickness.	5	II
j)	List the conditions for separation of boundary layer.	5	II
	Part-B		
Answer All the following questions. (5X10M=50Marks)			
2	A. Explain the working of micro manometer with a sketch. (5) B. State Newton's law of viscosity. Discuss the importance of viscosity of fluid motion. Add a note on the effect of temperature on the viscosity of water and air. (5)	1	III
	OR		
3	A.A U-tube differential manometer connects two pressure pipes 'A' and 'B'. Pipe 'A' contains liquid having a specific gravity 1.6 under a pressure of 11.7 N/cm^2 and pipe 'B' contains oil of specific gravity 0.78 under a pressure of 11.7 N/cm^2. The pipe 'A' lies 2.6 m above pipe 'B'. Find the difference of pressure measured by mercury as a fluid filling U-tube. (6) B.Write a short note on the phenomena of vapour pressure. (4)	1	IV
4	Derive the three dimensional continuity equation in Cartesian coordinate system. (10)	2	IV
	OR		
5	A wooden cylinder of diameter 'D" and length '2D' floats in water with its axis vertical. Is the equilibrium stable? Locate the metacentre with reference to water surface, if the specific gravity of wood is 0.59. (10)	2	V

6	Derive the Euler's equation of motion and hence deduce Bernoulli's equation. (10)	3	V
	OR		
7	A horizontal venturimeter with inlet and throat diameters 300 mm and 100 mm respectively is used to measure the flow of water. The pressure intensity at inlet is 130 kN/m^2, while the vacuum pressure head at the throat is 350 mm of mercury. Assuming that 3% of head is lost in between the inlet and throat, find: (i) The value of Co-efficient of discharge for the venturimeter and (ii) Rate of flow. (10)	3	IV
8	Derive the expression for Darcy Wiesbach formula to determine the head loss due to friction. (10)	4	V
	OR		
9	Two pipes are connected in parallel between two reservoirs that have difference in levels of 3.5 m. The length, diameter and friction factor (4f) are 2400 m, 1.2 m and 0.026 for the first pipe and 2400 m, 1 m and 0.019 for the second pipe. Calculate the total discharge between the two reservoirs? (10)	4	IV
10	A. Discuss the concept of boundary layer formation and displacement thickness. (6) B. Compare the lift and drag forces and write the equations used to estimate them. (4)	5	III
	OR		
11	Air flows over a flat plate, 1 m long at a velocity of 5.8 m/s. Determine (a) the boundary layer thickness at the end of plate (b) shear stress at the middle of plate (c) total drag per unit length on the sides of plate. Take $\rho = 1.23\ kg/m^3$ and $\upsilon = 0.16 \times 10^{-4}\ m^2/s$ for air. (10)	5	IV