R20 Regulation *Subject code: 3P3AE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, December 2024

FLUID MECHANICS

(Civil Engineering)

Maximum Marks: 70 Date:11.12.2024 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20) Marks)		CO	Bloom Tx
1	How does viscosity of fluid vary with temperature?	1	L1
2	What is the difference between U-tube differential manometer and inverted U-tube differential manometer? where are they used?	1	L1
3	State the stability criteria for a submerged body in unstable and neutral equilibrium positions.	2	L1
4	Distinguish between uniform and non-uniform flow.	2	L1
5	State Bernoulli's equation? Write the assumptions for such a derivation?	3	L1
6	What do you understand by turbulent flow?	3	L1
7	What do you understand by total energy line, hydraulic gradient line?	4	L1
8	Write the terms Pipes in parallel and series.	4	L1
9	Derive an expression for the displacement thickness.	5	L1
10	Define laminar boundary layer.	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	The shaft of diameter 100mm is rotating inside a journal bearing of diameter 102mm at a space of 360rpm. The space between shaft and bearing is filled with a lubricating oil of viscosity 5 poise. The length of the bearing is 200mm. Find the power absorbed in the lubricating oil. [10M]	1	L2
	OR		
12	A)Define manometer. How they are classified? [5M] B) Derive an expression for the total force and depth of center of pressure from free surface of a liquid of vertical plane surface submerged in liquid. [5M]	1	L2
13	A)Define stream function and velocity potential. What are their uses? [5M] B) Determine whether the following velocity components satisfy the continuity equation. i) $u = cx, v = -cy$ ii) $u = -cx/y, v = c \log xy$ [5M]	2	L2
	OR		

14	A) Explain stable, unstable and Neutral equilibrium of floating body. [5M] B) Explain the concept of floating body in two liquids. [5M]	2	L2
15	Derive Bernoulli's equation from Euler's equation of motion and assumptions made in it. [10M]	3	L2
	OR		
16	A) What are the applications of Momentum equation? [5M] B) A 450 reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 600mm and 300mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet to bend is 8.829N/cm^2 and rate of flow of water is 600litres/s. [5M]	3	L2
17	How will you determine the loss of head due to friction in pipes by using Darcy formula and chezy's equation? [10M]	4	L2
	OR		
18	A.A pipe of diameter 300 mm and length 1000 m connects two reservoirs, having difference of water levels as 15 m. Determine the discharge through the pipe. If an additional pipe of diameter 300 mm and length 600 m is attached to the last 600 m length of the existing pipe, find the increase in the discharge. Take f = 0.02 and neglect minor losses. [5M] B. Show that the loss of head due to sudden expansion in pipe line is a function of velocity head. [5M]	4	L2
19	Define displacement thickness. Derive an expression for displacement thickness? [10M]	5	L2
	OR		
20	Explain Boundary layer separation with a neat sketch. What are the conditions under which separation takes place? [10M]	5	L2