



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester:III
Class:SY	Program:B.Tech
Branch Code:CIV	Pattern:2022
Name of Course:Fluid Mechanics	Course Code:CIV222003
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 02 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Question No. 1 Attempt following Question

- 1a) Explain different types of fluids with their examples along with the rheological diagram. (6) CO1

Question No. 2 Attempt following Question

- 2a) Explain dimensional homogeneity and State the following laws : 1) Froude's model law 2) Reynold's model law. (6) CO2

Question No. 3 Attempt following Question

- 3a) A pipe has a length of 200 m with a slope of 1 in 100. the diameter of pipe changes from 1.0m at higher end to 0.5m at lower end. Find the pressure at the lower end if the discharge flowing through pipe is $5 \text{ m}^3/\text{min}$ and pressure at higher end is 45 kN/m^2 . (8) CO3

OR

- 3b) An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10cm. the oil mercury differential manometer shows a reading of 25 cm. Calculate the discharge of oil through the horizontal venturimeter. Take coefficient of discharge = 0.98 (8) CO3

- 3c) Derive the expression for discharge through venturimeter. (8) CO3

OR

- 3d) Derive the expression for Euler's equation of motion. (8) CO3

Question No. 4 Attempt following Question

- 4a) Derive Hagen Poissuelle's equation for laminar flow. (8) CO4

OR

4b) Write characteristics of turbulent flow. (8) CO4

4c) Derive the expression for Darcy Weisbach Equation. (8) CO4

OR

4d) An oil viscosity 0.1 N-s/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and length of 300m. The rate of flow of fluid through a pipe is 3.5 l/s . Find pressure drop in length of 300m. (8) CO4

Question No. 5 Attempt following Question

5a) Write a short note on prandtl mixing length theory. (8) CO5

OR

5b) What is boundary layer separation. Enlist the methods to control boundary layer separation. (8) CO5

5c) Explain with neat sketch: hydrodynamically smooth and rough boundaries. (8) CO5

OR

5d) Write a short note on friction factor of commercial pipes. (8) CO5

XXXXXXXXXXXXXXXXXXXXXXXXXXXX