BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH   SEMESTER: III
BRANCH: CHEM   SESSION: MO/2022

SUBJECT: CL203 FLUID MECHANICS

TIME: 2 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1		A U-Tube manometer is used to measure the pressure of water in a pipeline, which is in excess of atmospheric pressure. The right limb of the manometer contains mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10 cm and the free surface of mercury is in level with the centre of the pipe. If the pressure of water in pipeline is reduced to 9810 N/m^2, calculate the new difference in the level of mercury. Sketch the arrangements in both cases.	[5]	CO1	BL3
Q2		Determine the total pressure and depth of centre of pressure on a plane rectangular surface of 1 m wide and 3 m deep when its upper edge is horizontal and (a) coincides with water surface (b) 2 m below the free water surface.	[5]	CO1	BL5
Q3	(a)	Discuss the two methods of describing the fluid motion?	[2]	CO2	BL2
	(b)	Explain the concept of boundary layer.	[3]	Co-2	BL1
Q4	(a)	Categorize the fluids according to rheology.	[3]	CO-2	BL2
	(b)	What is turbulence in fluid flow? Explain the nature and quantification of turbulence	[2]	CO-2	BL2
Q5		Derive Hagen-Poiseuille equation for incompressible, steady and uniform laminar flow through circular cross-sectional pipe.	[5]	CO-3	BL2

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