BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2023)

CLASS: B.TECH. **SEMESTER : III**
BRANCH: CIVIL **SESSION : MO/2023**

SUBJECT: CE203 FLUID MECHANICS

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	Write the units and dimensions of the following: (i) density, (ii) specific weight, (iii) viscosity, and (iv) surface tension	[2]	CO1	1
Q.1(b)	A cylinder of 0.3 m diameter rotates concentrically inside a fixed cylinder 0.31 m diameter. Both the cylinders are 0.3 m long. Determine the viscosity of the liquid which fills the space between the cylinders if a torque of 0.98 N-m is required to maintain an angular velocity of 60 rpm.	[3]	CO1	3
Q.2(a)	Derive the expression for internal pressure inside a liquid droplet.	[2]	CO1	3
Q.2(b)	With the help of a diagram, show the following: (i) atmospheric pressure, (ii) absolute pressure, (iii) gage pressure, (iv) vacuum pressure	[3]	CO2	2
Q.3(a)	With the help of a sketch, briefly explain the working of a U-tube differential manometer.	[2]	CO2	1
Q.3(b)	A circular plate 2.5 m diameter is immersed in water, its greatest and least depth below the free surface being 3 m and 1 m respectively. Find (a) hydrostatic force on one face of the plate and (b) the position of centre of pressure.	[3]	CO2	3
Q.4(a)	For the velocity components in a fluid flow given by $u = 2xy$ $v = a^2 + x^2 - y^2$ Show that the flow is possible.	[2]	CO2	3
Q.4(b)	A pipeline is 15 cm in diameter and is at an elevation of 100.00 m at Section – A. At Section – B it is at an elevation of 107.00 m and has a diameter of 30 cm. When a discharge of 50 lit/s of water is passed through this pipe, the pressure at Section – A is observed to be 30 kPa. The energy loss in the pipe is 2 m. Calculate the pressure at B when the flow is from A to B.	[3]	CO3	3
Q.5(a)	Derive the formula for discharge over a rectangular sharp crested weir.	[2]	CO3	3
Q.5(b)	A vertical venturimeter 40 cm X 20 cm is provided in a vertical pipe to measure the flow of oil of RD = 0.8. The difference in elevations of the throat section and the entrance section is 1 m. The direction of flow being vertically upwards. The U-tube differential manometer shows a reading of 40 cm. Determine the discharge through the pipe.	[3]	CO3	3

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