BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: B.Tech. **SEMESTER : III/ADD**
BRANCH: CIVIL **SESSION : MO/2024**

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)	Define the following fluid properties. Also, mention their units and dimensions. (i) density, (ii) specific weight, (iii) specific gravity, and (iv) viscosity	[2]	CO1	2
Q.1(b)	A cylinder of 0.3 m diameter rotates concentrically inside a fixed cylinder 0.31 m diameter. Both the cylinders are 0.5 m long. Determine the viscosity of the liquid which fills the space between the cylinders if a torque of 1.2 N-m is required to maintain an angular velocity of 90 rpm.	[3]	CO1	3
Q.2(a)	Briefly discuss the practical implications of any two of the following fluid properties. (i) vapour pressure, (ii) bulk modulus of elasticity, (iii) surface tension	[2]	CO1	2
Q.2(b)	What is the pressure within a droplet of water 0.045 mm in diameter at 20 ^{o}C, if the pressure outside the droplet is standard atmospheric pressure of 1.03×10^5 N/m^2? Given that σ = 0.075 N/m for water at 20^{o}C.	[3]	CO1	3
Q.3(a)	With the help of a sketch, define the following. (i) atmospheric pressure, (ii) absolute pressure, (iii) gage pressure, and (iv) vacuum pressure	[2]	CO2	2
Q.3(b)	Discuss briefly the measurement of pressure using a U-tube manometer and a U-tube differential manometer.	[3]	CO2	2
Q.4(a)	Define metacentre and metacentric height.	[2]	CO2	2
Q.4(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.5(a)	What are the basic principles of fluid flow? What are the corresponding equations?	[2]	CO2	2
Q.5(b)	For the velocity components in a fluid flow given by $\boldsymbol{u = 2xy}$ $\boldsymbol{v = a^2 + x^2 - y^2}$ Show that the flow is possible. Obtain the relevant stream function.	[3]	CO2	3

:::::23/09/2024 E:::::