

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

CLASS: B.TECH.
BRANCH: CIVIL ENGINEERING

SEMESTER: III
SESSION: MO/2022

SUBJECT: CE203 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 hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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			CO	BL
Q1 (a)	With the help of a rheological diagram differentiate between ideal fluid and real fluid.	[2]	CO1	2
Q1 (b)	What is the pressure within a droplet of water 0.05 mm in diameter at 20 °C, if the pressure outside the droplet is standard atmospheric pressure of 1.03×10^5 N/m ² ? Given that $\sigma = 0.075$ N/m for water at 20°C.	[3]	CO1	3
Q2 (a)	With the help of a sketch, explain the measurement of pressure using a U-tube manometer.	[2]	CO2	2
Q2 (b)	A 3.6 m X 1.5 m wide rectangular gate MN is vertical and is hinged at point 0.15 m below the centre of gravity of the gate. The total depth of water is 6 m. What horizontal force must be applied at the bottom to keep the gate closed?	[3]	CO2	3
Q3 (a)	What are the basic principles of fluid flow? Also mention the equations derived from these principles.	[2]	CO2	1
Q3 (b)	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. Obtain the relevant stream function.	[3]	CO2	4
Q4 (a)	Write the Bernoulli's energy equation and explain each term in it. What are the assumptions in deriving this equation?	[2]	CO3	1
Q4 (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 (i) A to B (ii) B to A.	[3]	CO3	3
Q5 (a)	What are the applications of impulse momentum equation?	[2]	CO3	2
Q5 (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