



**HAVRACHANA
UNIVERSITY**
a UGC recognized University

School: School of Engineering and Technology
Program/s: Civil Engineering, SET
Year: 2nd **Semester:** 3rd
Examination: End Semester Examination
Examination year: December - 2023

Course Code: CE 207 **Course Name:** Fluid Mechanics I
Date: 21/11/2023
Time: 1:00 pm to 03:00 pm

Total Marks: 40
Total Pages: 2

Q.1	Answer the following questions	Marks	CO	BT
1.	A pipeline carrying oil of specific gravity 0.85, changes in diameter from 350 mm diameter at position A to 580mm diameter to a position B which is 4.2 m at a higher level. If the pressure at A and B are 9.81 N/cm ² and 5.889N/cm ² respectively. The discharge is 290 lits/sec. determine the loss of head and direction of flow.	5	CO4	BT3 BT4
2	State Bernoulli's theorem with its assumptions. State practical application of Bernoulli's equation. A pipe through which water is flowing having diameters 20 cm and 10cm at the cross sections 1 and 2 respectively. The velocity of water at section 1 is given 4 m/s. find the velocity head at section 1 and 2. Also find the rate of discharge.	5	CO4 CO4	BT2 BT3. BT4
3	Water flows through a pipe AB 1.5m diameter at 3.2 m/s and then passes through a pipe BC 1.8 m diameter. At C, pipe branches. Branch CD is 0.9m in diameter and carries two third of the flow in AB. The flow velocity in branch CE is 2.8 m/s. Find the volume of the flow in AB, velocity in BC, the velocity in CD and the diameter of CE.	5	CO3	BT2
4	An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20cm and throat diameter 10cm. the oil mercury differential manometer shows a reading of 25cm. Calculate the discharge of oil through the horizontal venturimeter. Take $C_d = 0.98$	5	CO3, CO4	BT3. BT4
OR				
4	A 20cm x 10cm venturimeter is inserted in a vertical pipe carrying oil of specific gravity 0.8 the flow of oil is in upward directions. The difference of levels between throat and inlet section is 50cm. The oil mercury differential manometer gives a reading of 30cm of mercury. Find the discharge of oil.	5	CO2	BT1
5	Draw a detailed figure of venturimeter and derive the equation for the same.	5	CO3	BT3. BT4 BT5
Q.2 1.	The velocity potential function is given by $\phi = 8(2X^2 - Y^2)$. Calculate the velocity components at the point (5,7)	5	CO2	BT5
OR				
1.	Derive the relation between stream function and velocity potential function. The velocity potential function is given by $\phi = 6(X^2 - Y^2)$. Calculate the velocity components at the points (3,4)	5	CO2	BT5
2.	Define the following terms (Any five) Steady uniform flow Incompressible flow Turbulent flow Hydrostatic law Kinematic and dynamic viscosity	5	CO1 CO2	BT1

	Principle of Continuity equation			
Q.3	Derive an equation for inclined plane surface submerged in liquid.	5	CO1	BT2
	OR			
	A solid cylinder of diameter 3m has a height of 4m. Find the metacentric height of the cylinder when it is floating in water with its vertical axis. The specific gravity of the cylinder = 0.7	5	CO1	BT4