Course Code:**23CE3T03**

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE

(AUTONOMOUS)

II - B. Tech I-Semester Supplementary Examinations (BR23), March - 2026

FLUID MECHANICS (CIVIL ENGINEERING)

Time: 3 hours Max. Marks: 70

Question Paper consists of Part-A and Part-B
*Answer **ALL** the question in **Part-A and Part-B***

PART–A (10X2 = 20M)

		Marks	CO	BL
1. a)	Define the terms surface tension and capillarity.	(2M)	CO1	BL1
b)	Define dynamic viscosity and kinematic viscosity?	(2M)	CO1	BL2
c)	Define Pascal's law.	(2M)	CO2	BL1
d)	Explain atmospheric, gauge and vacuum pressures.	(2M)	CO2	BL2
e)	Define mass momentum equation?	(2M)	CO3	BL1
f)	Define rotational and irrotational flows?	(2M)	CO3	BL1
g)	What are the assumptions made in Bernoulli's equation?	(2M)	CO4	BL2
h)	Define Mach Number.	(2M)	CO4	BL1
i)	What do you understand by Total energy line?	(2M)	CO5	BL2
j)	Discuss minor losses in pipes.	(2M)	CO5	BL3

PART–B (5X10 = 50M)

			Marks	CO	BL
2	a	State and explain the Newton's law of viscosity. Deduce the expression for the dynamic viscosity.	(5M)	CO1	BL1
	b	Calculate the specific weight, specific mass, specific volume and specific gravity of a liquid having a volume of 6 m^3 and weight of 44 kN.	(5M)	CO1	BL2
		(OR)			
3	a	What are Newtonian and non-Newtonian fluids? Explain using examples.	(5M)	CO1	BL1
	b	An oil film of thickness 1.5 mm is used for lubrication between a square plate of size 0.9 m × 0.9 m and an inclined plane having an angle of inclination 200. The weight of the square plate is 392.4 N and it slides down the plane with a uniform velocity of 0.2 m/s. Find the dynamic viscosity of the oil.	(5M)	CO1	BL3
4	a	Explain about differential manometers? (i)U-tube differential manometer (ii)Inverted U-tube differential manometer	(5M)	CO2	BL1
	b	Explain about bourdon tube pressure gauge?	(5M)	CO2	BL3
		(OR)			
5	a	Derive an expression for total pressure & depth of centre of pressure from free surface of liquid of an inclined plane surface sub-merged in the liquid?	(5M)	CO2	BL3
	b	A differential manometer is connected to two pipes whose centres are at 3m difference in height. Higher level pipe is carrying liquid of specific gravity of 0.9 at a pressure of 1.8 bar and another pipe is carrying liquid at specific gravity of 1.5 at	(5M)	CO2	BL2

a pressure of 1 bar. The centre of pipe carrying low pressure liquid is 2m above the higher level of the mercury in the manometer. Find out the difference in mercury level in the manometer in cm.

6	a	Explain the terms: (i) Path line (ii) Streak line (iii) Streamline (iv) Stream tube.	(5M)	CO3	BL2
	b	Define velocity potential function and stream function and list out its properties. What is the relationship between the stream function and velocity potential function	(5M)	CO3	BL1
		(OR)			
7	a	Derive the equation of continuity for one dimensional flow of an incompressible fluid.	(5M)	CO3	BL3
	b	What is the velocity stream function, and potential function. A stream function is given by $\Psi = 3x^2 - y^3$. Determine the magnitude of velocity components at the point (2, 1).	(5M)	CO3	BL3
8	a	What is Euler's equation? How will you obtain Bernoulli's equation from it?	(5M)	CO4	BL1
	b	A 330 mm diameter 1200 bend discharges 0.4 m^3/s of water in the atmosphere. If the pressure of water entering the bend is 160 kN/m^2(guage), determine the force required to hold the bend in place. Assume the bend to be in horizontal plane.	(5M)	CO4	BL2
		(OR)			
9	a	Define mass momentum equation and its applications?	(5M)	CO4	BL2
	b	The water is flowing through a taper pipe of length 100m having diameters 600mm at the upper end and 300mm at the lower end at the rate of 50lit/s. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62N/cm^2.	(5M)	CO4	BL2
10	a	Evaluate Darcy-Weisbach equation for loss of head in a pipe.	(5M)	CO5	BL3
	b	A horizontal pipe of diameter 500 mm is suddenly contracted to a diameter of 250 mm. The pressure intensities in the large and smaller pipe is given as 13.734N/cm^2 and 11.772N/cm^2 respectively. Find the loss of head due to contraction if Cc=0.62. Also determine the rate of flow of water.	(5M)	CO5	BL3
		(OR)			
11	a	Explain how the following flow problems are analysed. i) Series pipe connection (ii) parallel pipe connection and iii) Equivalent pipe connection	(5M)	CO5	BL2
	b	The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300m, 170m, and 210m and of diameters 300mm, 200mm and 400mm respectively is 12m. Determine the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively. Considering: (i) minor losses (ii) neglecting minor losses.	(5M)	CO5	BL3

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