PVP 20

Code: 20CE3301

II B.Tech - I Semester – Regular / Supplementary Examinations
DECEMBER 2022

MECHANICS OF FLUIDS
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Define the following fluid properties and give their units i) Specific weight ii) Specific gravity iii) Surface tension iv) Vapour pressure	L2	CO1	8 M
	b)	A differential manometer connected at the two points A and B at the same level in a pipe containing an oil of specific gravity 0.8, shows a difference in mercury level as 100 mm. Determine the difference in pressure between the two points.	L3	CO1	6 M
OR					
2	a)	Explain the working principle of Bourdon's pressure gauge with a neat sketch.	L2	CO1	6 M
	b)	The surface tension of water in contact with air at 20^0C is 0.0725 N/m. The pressure inside a droplet of water is to be 0.02 N/cm^2 greater than the outside pressure. Calculate the diameter of the droplet of water.	L3	CO1	8 M

UNIT-II					
3	a)	Define Total pressure and Centre of pressure and prove that the centre of pressure of any lamina immersed in a liquid lies always below its centre of the gravity.	L3	CO2	7 M
	b)	Derive an expression for continuity equation for a steady one dimensional flow of incompressible fluid.	L3	CO2	7 M
OR					
4	a)	A rectangular plane surface 2m wide and 3m deep lies in water in such a way that its plane makes an angle of 30^0 with the free surface of water. Determine the total pressure and position of centre of pressure when the upper edge is 1.5 m below the free water surface.	L3	CO2	7 M
	b)	Explain in detail, the various types of fluid flow.	L2	CO2	7 M
UNIT-III					
5	a)	Derive Euler's equation of motion along a stream line and integrate it to obtain Bernoulli's equation. State all the assumptions made.	L3	CO3	8 M
	b)	What is boundary layer separation? What are the various conditions related to boundary layer separation?	L2	CO3	6 M
OR					

6	a)	State momentum equation. How will you apply momentum equation for determining the force exerted by a flowing liquid on a pipe bend?	L3	CO3	8 M
	b)	Experiments were conducted on a wind tunnel with a wind speed of 50 km/h on a flat plate of size 2 m long and 1 m wide. The density of air is 1.15 kg/m^3. The coefficients of lift and drag are 0.75 and 0.15 respectively. Determine i) The lift force ii) The drag force and iii) Resultant force.	L3	CO3	6 M
UNIT-IV					
7	a)	Prove that the velocity distribution for laminar flow between two parallel plates when both are fixed, is parabolic in nature and that the maximum velocity is equal to 1.5 times the mean velocity.	L3	CO4	8 M
	b)	Explain in detail, the terms HGL and TEL of a pipe line.	L2	CO4	6 M
OR					
8	a)	Derive a relationship between shear stress and pressure gradient for viscous flow in a horizontal pipe (Hagen poiselli's equation).	L3	CO4	6 M
	b)	Two pipes of lengths 2500 m each and diameters 80 cm and 60 cm respectively are connected in parallel. The coefficient of friction for each pipe is 0.006. The total flow is equal to 250 lit/s, find the rate of flow in each pipe.	L3	CO4	8 M

UNIT-V					
9	a)	Derive an expression for discharge through rectangular notch.	L3	CO5	6 M
	b)	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 direction. The difference of levels between the throat and inlet section is 50 cm. The oil-mercury differential manometer gives a reading of 30 cm of mercury. Find the discharge of oil. Neglect losses.	L3	CO5	8 M
OR					
10	a)	What is a pitot-tube? How will you determine the velocity at any point with the help of pitot-tube?	L3	CO5	6 M
	b)	The following data related to an orifice meter Diameter of the pipe = 240mm Diameter of orifice = 120mm Specific gravity of oil = 0.88 Reading of the differential manometer = 400mm of mercury C_d = 0.65 Determine the rate of flow.	L3	CO5	8 M