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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II–B.TECH–II–Semester End Examinations (Regular) - June- 2022
FLUID MECHANICS AND HYDRAULIC MACHINES
(MECH)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: 1. Answer *any* ***FIVE*** *questions. Each question carries 14 marks.*
2. All questions carry equal marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

5X14=70

1.	a)	State the Newton's law of viscosity along with examples of its application and about the effect of temperature on viscosity.	[7M]
	b)	A simple U- manometer is installed across an orifice meter. The manometer is filled with mercury (specific gravity=13.6) and the liquid above the mercury is carbon tetra chloride (specific gravity=1.6).The manometer reads 200 mm. What is the pressure difference over the manometer in N/m^2.	[7M]
2.	a)	Explain the various types of fluid flows.	[7M]
	b)	Explain the application of momentum equation for finding the force acting on pipe bends.	[7M]
3.	a)	What do you understand by displacement thickness and momentum thickness? Explain.	[7M]
	b)	Two pipes of diameters of 5 cm and 10 cm and each 200 m in length are connected parallel between two tanks having a water level difference of 10 m. If these two pipes are to be replaced by a single pipe supplying the same quantity of water, find out the required diameter. Take friction factor f = 0.04 for all pipes and neglect minor losses.	[7M]
4.	a)	Derive the expression for the impact force and work done on a moving curved plate when the jet strikes the plate at the center.	[7M]
	b)	Explain the working of Pelton turbine with a neat sketch.	[7M]
5.	a)	Explain the functions of various components and working principle of centrifugal pump.	[7M]
	b)	Derive the expression for discharge for a single acting reciprocating pump of piston area A having stroke length L when crank is rotating with a speed of N rpm.	[7M]
6.	a)	Define the terms gauge pressure, vacuum pressure and absolute pressure. Indicate their relative positions on chart.	[7M]
	b)	The pressure intensity at a point in a fluid measures 3.942 N/cm^2. Evaluate the corresponding height of fluid for (i) Water (ii) Kerosene with specific gravity of 0.82 (iii) Mercury with specific gravity of 13.6.	[7M]
7.	a)	Derive the continuity equation for one dimensional flow.	[7M]
	b)	A 40 cm diameter pipe conveying water, branches into two pipes of diameters 30cm and 20cm respectively. If the average velocity in the 40cm diameter pipe is 3 m/s. Find the discharge in this pipe. Also determine the velocity in 20cm pipe if the average velocity in 30cm diameter pipe is 2 m/s.	[7M]
8.	a)	What do you understand by the terms boundary layer and boundary layer theory for flow over a flat plate? Sketch the three different regions of flow on the flat plate indicating the growth of boundary layer thickness.	[7M]
	b)	Determine the difference in the elevations between the water surfaces in the two tanks which are connected by a horizontal pipe of diameter 300 mm and length 400 m. The flow rate of water through the pipe is 300 liter/s. Consider all losses and take friction factor f=0.008.	[7M]

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