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Sanjay Ghodawat University, Kolhapur Established as State Private University under Govt. of Maharashtra. Act No XL, 2017		2018-19 EXM/P/09/01
Year and Program: SY B. Tech	**School:** Technology	**Department:** Mechanical Engg.
Course Code: MET208	**Course Title:** Fluid Mechanics.	**Semester:** III
Day and Date: Tuesday 28-05-2019	**End Semester Examination (ESE)**	**Time:** 3Hr. **Max Marks:** 100 10.30 am to 1.30 pm

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3) Figures to the right indicate full marks.

		Marks	Bloom's Level	CO
Q.1	**Attempt the following**			
a)	Explain the following: i) Viscosity. ii) Surface tension. iii) Capillarity.	06	L_2	CO1
	OR			
a)	Define Buoyancy and meta center.	06	L_1	CO1
b)	Explain the following: i) Newtonian fluid and non-Newtonian fluid. ii) Uniform and non-uniform flow. iii) Compressible and incompressible flow.	06	L_2	CO2
	OR			
b)	Explain with a neat sketch how pitot tube is used to measure discharge through pipe.	06	L_2	CO2
Q.2	**Attempt the following.**			
a)	Define the terms Major energy loss and Minor energy loss in pipes. What are the causes of these losses? Write the equations which are used to calculate these losses.	06	L_1	CO3
	OR			
a)	Discuss the velocity distribution and shear stress distribution of a viscous fluid flowing between two parallel fixed plates.	06	L_2	CO3
b)	Explain the terms: 1. Laminar sub layer. 2. Boundary layer thickness. 3. Displacement thickness.	06	L_2	CO4
	OR			
b)	Explain development of boundary layer on a flat plate kept parallel	06	L_2	CO4

to flow of fluid.

Q.3 **Solve any Two.**

a)	Calculate the capillary rise or capillary fall in mm in a glass tube of 4 mm diameter, when immersed in i) water ii) mercury. Take density of water as 998 kg/m^3, surface tension of water and mercury in contact with air as 0.073575 N/m and 0.51 N/m respectively and angle of contact for water as zero and that for mercury as 130^0.	08	L_3	CO1
b)	A 300 mm diameter pipe conveying water, branches into two pipes of diameters 200 mm and 150 mm respectively. If the average velocity in the 300 mm diameter pipe is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 150 mm diameter pipe, if the average velocity in the 200 mm diameter pipe is 2 m/s.	08	L_3	CO2
c)	Find the head lost due to friction in a pipe of diameter 300 mm and length 50 m through which water is flowing at a velocity of 3 m/s using i) Darcy formula ii) Chezy's formula, take C= 60 and kinematic viscosity for water = 0.01 stokes.	08	L_3	CO3
d)	A flat plate 1.5 m x 1.5 m moves at 50 km/h in a stationary air of density 1.15 kg/m^3. If the coefficient of lift and drag are 0.75 and 0.15 respectively. Determine i) lift force ii) drag force iii) resultant force and iv) power required to keep the plate in motion.	08	L_3	CO4

Q.4 **Solve any Two.**

a)	Explain Rayleigh's method of dimensional analysis.	09	L_2	CO5
b)	The pressure difference (Δp) for viscous flow in a pipe depends on diameter of pipe (D), length of pipe (L), The velocity (V), viscosity (μ) and density (ρ). Using Buckingham's theorem obtains an expression for Δp.	09	L_3	CO5
c)	Write a note on geometric similarity, kinematic similarity and dynamic similarity.	09	L_1	CO5

Q.5 **Solve any Two.**

a)	Explain Continuity equation and Bernoulli's equation for one dimensional compressible flow.	09	L_2	CO6
b)	Explain the significance of Mach number with suitable examples.	09	L_2	CO6
c)	Show that the velocity of sound in an adiabatic gas flow is given by, $C = \sqrt{KRT}$, with usual notations.	09	L_2	CO6

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Q.6 **Solve any Three.**

a)	Explain Buckingham's π theorem.	08	L_2	CO5
b)	Write a note on similitude and types of similarities.	08	L_2	CO5
c)	Explain the term compressible flow with suitable examples.	08	L_2	CO6
d)	Explain basic thermodynamic equation of state for proper analysis of compressible flow.	08	L_2	CO6

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