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 Name of Examination : **Winter 2020** - (Preview)

 Course Code & Course Name : **ME201U - Fluid Mechanics**

 Generated At : **19-04-2022 11:08:04**

 Maximum Marks : **60**

 Duration : **3 Hrs**

 Edit Print View Answer Key Close **Answer Key Submission Type:** Marking scheme with model answers and solutions of numerical

Instructions:

1. All questions are compulsory.
2. Illustrate your answer with suitable figures/sketches wherever necessary.
3. Assume suitable additional data; if required.
4. Use of logarithmic table, drawing instruments and non programmable calculators is allowed.
5. Figures to the right indicate full marks.

1) Solve all sub-questions

- a) Define surface tension. Derive an expression for pressure intensity inside the liquid droplet. [6]
- b) Explain the terms i) Displacement thickness ii) Momentum thickness iii) Energy thickness [6]

2) Solve all sub-questions

- a) Define and explain the terms i) Velocity potential function ii) Stream function [8]
- b) Derive Euler's equation of motion. How will you obtain Bernoulli's equation from it. [8]

3) Solve any two sub-question

- a) A vertical cylinder of diameter 180 mm rotates concentrically inside another cylinder 181.2 mm. both the cylinders are 300 mm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. Determine the viscosity of the fluid if a torque of 20 Nm is required to rotate the inner cylinder at 120 rpm. [8]
- b) A square aperture in the vertical side of a tank has one diagonal vertical and is completely covered by a plane plate hinged along one of the upper sides of the aperture. The diagonals of the aperture are 2 m long and the tank contains a liquid of specific gravity 1.15. The centre of aperture is 1.5 m below the free surface. Calculate the thrust exerted on the plate by the liquid and position of its centre of pressure. [8]
- c) State and prove the Hydrostatics law. [8]

4) Solve any two sub-question

- a) What do you mean by dimensionless number? Define and explain any three dimensionless number [8]
- b) A 30 cm X 15 cm venturimeter is inserted in vertical pipe carrying water, flowing in the upward direction. A differential mercury manometer connected to the inlet and throat gives a reading of 20 cm. Find the discharge. Take $C_d = 0.98$. [8]
- c) A syphon of 200 mm diameter connects two reservoirs having a difference in elevation of 15 m. The total length of syphon is 600 m and the summit is 4 m above the water level in the upper reservoir. If the separation takes place at 2.8 m of absolute, find the maximum length of syphon from upper reservoir to summit, Take $f = 0.004$ and atmospheric pressure = 10.3 m of water. [8]

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