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10AE63

Sixth Semester B.E. Degree Examination, June/July 2018
Aerodynamics – II

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What is a source flow? Derive the velocity potential for a 2-D source flow. **(10 Marks)**

b. Derive an expression for the velocity potential due to vortex sheet. **(10 Marks)**

2 a. Explain what is Down wash and bring out how downwash creates induced drag. **(10 Marks)**

b. What is Prandtl's Lifting theory limitation? Explain. **(10 Marks)**

3 a. For a 2-D flow, derive the velocity potential equation. **(10 Marks)**

b. What is Prandtl-Glaurt compressibility correction? **(10 Marks)**

4 a. Explain what is Area Rule. **(10 Marks)**

b. Derive an expression for the critical Mach Number. of an aerofoil. **(10 Marks)**

PART – B

5 a. Explain what is ground effect. **(10 Marks)**

b. What is the advantage of flying in formation. **(10 Marks)**

6 a. What is a slender body and explain what are the assumptions taken for analysis. **(10 Marks)**

b. Derive C_P for a flow past a cylinder. **(10 Marks)**

7 a. What are the effects of "Swept back wings"? **(10 Marks)**

b. What are high life devices? Explain how leading edge and trailing edge flaps increase lift. **(10 Marks)**

8 a. The velocity profile for fully developed laminar flow between two parallel plates separated by a distance 2b is given by $u = u_{max}\left(1-\frac{y^2}{b^2}\right)$ where u_{max} is the centre line velocity (at y = 0). Determine the shear force per unit volume on a fluid element in the x-direction. Find the maximum value of this quantity for this flow, when b = 1 m, u_{max} = 2 m/s and $\mu = 10^{-1}$ Nsec/m^2 **(10 Marks)**

b. Derive Blasius function expression. **(10 Marks)**

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