USN | | | | | | | | | | **10AE63**

Sixth Semester B.E. Degree Examination, June/July 2015

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. Explain with neat sketch, Kulta – Joukourshi theorem for the surface of a body of arbitrary shape. **(08 Marks)**
    b. Consider non lifting flow over arbitrary body and describe the procedure to calculate the pressure co-efficient at i^{th} control point through source panel method. **(12 Marks)**

2   a. Discuss briefly the following:
       i) Vortex filament   ii) Induced drag
       iii) Biot-Savarh law   iv) Helmholtz's vortex theorem **(16 Marks)**
    b. Explain the importance of aspect ratio of finite wing. **(04 Marks)**

3   a. Derive the governing velocity potential equation for an inviscid compressible, irrotational subsonic flow over a body immersed in an uniform stream. **(12 Marks)**
    b. Explain in brief the Prandtl Glauset compressibility correction. **(08 Marks)**

4   a. Derive the relation for critical pressure coefficient in terms of free stream mach number. **(10 Marks)**
    b. Explain how to find the critical mach number for an air foil. **(06 Marks)**
    c. The critical mach number for an airfoil is 0.62. Find the critical pressure co-efficient ($\gamma = 1.4$). **(04 Marks)**

PART – B

5   a. Derive an expression for lift co-efficient and induced drag co-efficient is term of circulation strength $\Gamma(y)$ for a finite wing, through Prandtl's classical lifting line theory. **(14 Marks)**
    b. Explain down wash and induced drag. **(06 Marks)**

6   a. Explain with neat sketch, the boundary condition for a 2D (or) axially symmetric body. **(12 Marks)**
    b. What are the different types of small perturbation flows? Briefly explain with relevant sketches. **(08 Marks)**

7   a. Discuss the advantages of swept wings modern airplanes. **(08 Marks)**
    b. What are high lift devices? List them. Explain their effects on aerodynamics characteristic. **(12 Marks)**

8   a. Derive the Blasuis equation for a incompressible flow over a flat plate. **(12 Marks)**
    b. What is the boundary layer theory? Explain laminar, turbulent boundary layer and transition over a flat plate at low speed. **(08 Marks)**

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